PAINT and VARNISH Production

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

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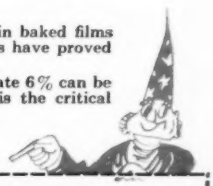

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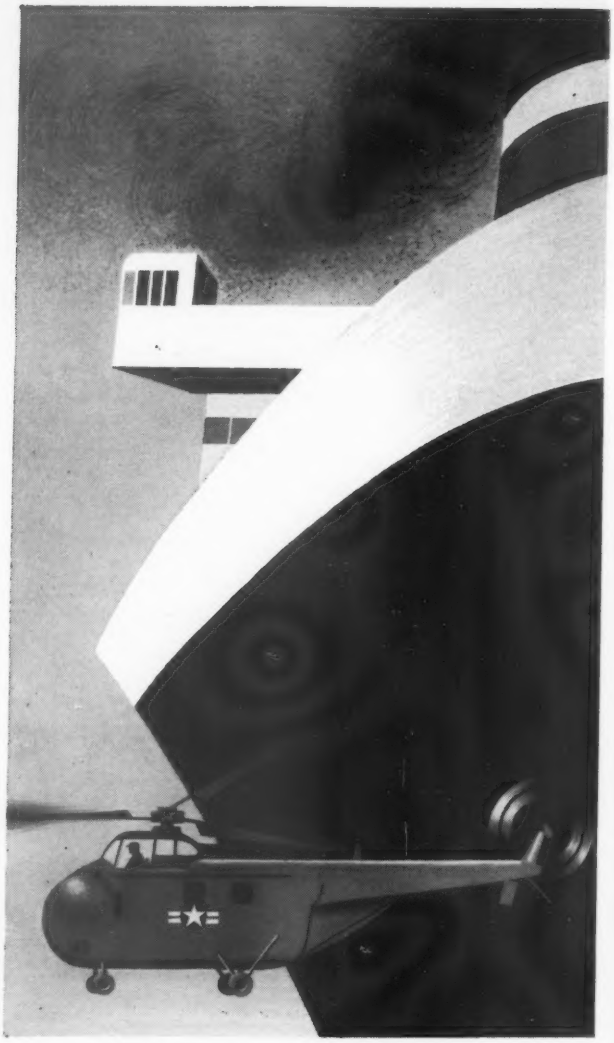

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(Established in 1910 as The Paint and Varnish Record)

VOL. 43 JUNE, 1953 NO. 6

NEXT ISSUE

"Paper Coatings" will be the subject of an article for the July number. The article will be concerned with the classifications of various coatings, formulation of various types, detailed discussion of the various polymers currently used in paper coatings and the properties they impart, and future trends.

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Research Spurs Chemical Growth

SINCE 1950, the chemical industry has been undergoing phenomenal growth and expansion. It is estimated that by 1955, most lines of chemical production will have an increased capacity ranging from 20 to 600 percent. The continued surge in expansion virtually assures the chemical industry first place in the nation's entire industrial effort.

One of the most important factors contributing to the great success of the chemical process industries is research. As a whole, the chemical industry has spent considerably more money per sales dollar for research than any other industry.

Many firms claim that a good percentage of their current sales have resulted from products which were not commercially feasible ten years ago, but made possible only through research.

A case in point is the Dow Corning Corporation, a major producer of silicone products. Basic research in the field of silicones began some twenty years ago by a group of chemists and physicists of the Corning Glass Works. The Dow Chemical Company supplied the chemical "know-how" for commercially producing these materials. Both firms joined forces in early 1943 to form the Dow Corning Corporation.

During the first eight years, Dow Corning doubled, redoubled, and doubled again its productive capacity. Gross sales increased from 15,000 dollars during the first full month of business to a present volume of 1,500,000 dollars a month. Some 16 million dollars is being "pumped" back into a new expansion program, which will mean a four-fold increase in capacity within the next two years.

By pursuing an aggressive research and product engineering program, Dow Corning has been able to enter into many lines of business—all of which have contributed to the rapid growth of this firm.

The recent announcement by Bakelite regarding their expansion program in the field of polyethylene plastic is another striking example of the benefits of research. Because of the versatility of this plastic, it has a wide range of uses, especially in the packaging field.

However, the manufacture of polyethylene requires very high pressures. In fact, H. S. Bunn, president of the firm, stated that the pressures employed are the highest at which any continuous commercial process is operated today. Solution of the many chemical and engineering problems involved in building such high pressure equipment was credited by Mr. Bunn to research scientists drawn from all divisions of Union Carbide with wide backgrounds of knowledge and experience in chemistry, metallurgy, mechanics and thermodynamics.

As Mr. Bunn aptly said, "Without this background, and without auxiliary chemical producing units, it would cost a new manufacturer more than 100 million dollars to duplicate Union Carbide's facilities for polyethylene and its compounds."

The Colorful French

THE French are getting quite color conscious. A recent column in the European edition of the *New York Herald-Tribune* reported that the Eiffel Tower is being painted in a three tone color, described as cognac brown. The top will be a golden brown color, a shade darker in the middle and even a shade darker at the bottom.

The job will take two years—one half will be painted up until June and painting will be resumed in September and continued until November; the other half will be done next year. The Paris Chamber of Commerce wants no painting during the heavy tourist season expected this summer.

Short handled nylon brushes, no longer than twelve inches will be used. It has been found that long handled brushes cause the paint to drip down the vertical filigree work of the tower. Each brush is expected to take care of 2,000 square meters of surface and 1,200 of them will be used.

The reason for the cognac brown is purely esthetic because, according to the paint manufacturer, it is the exact complement of the Paris sky.

Color dynamics seem to be spreading to Paris, but to the ordinary Frenchmen—*c'est quelque-chose formidable!*

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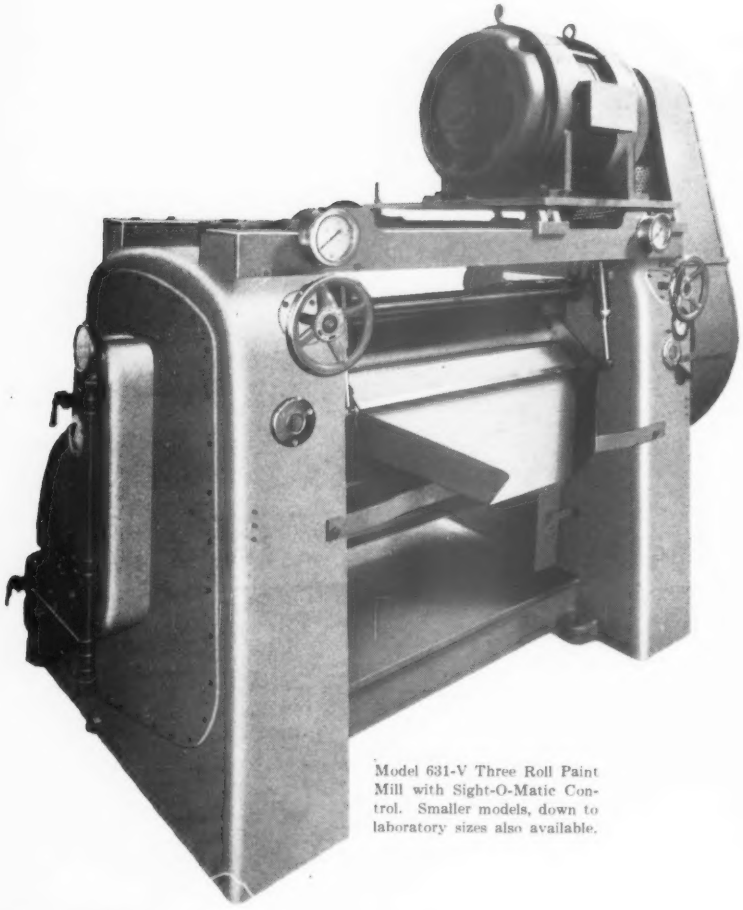

Model 631-V Three Roll Paint Mill with Sight-O-Matic Control. Smaller models, down to laboratory sizes also available.

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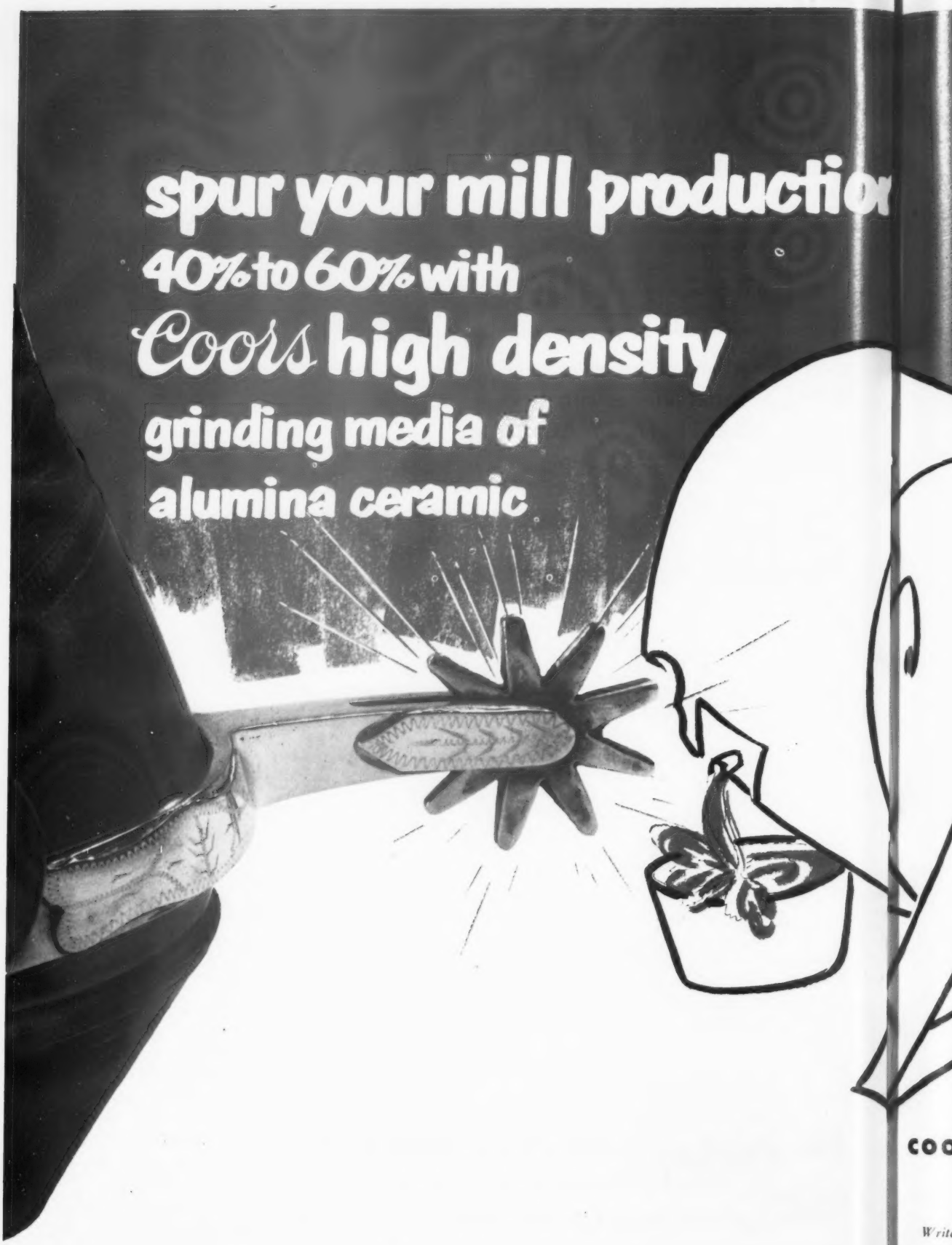
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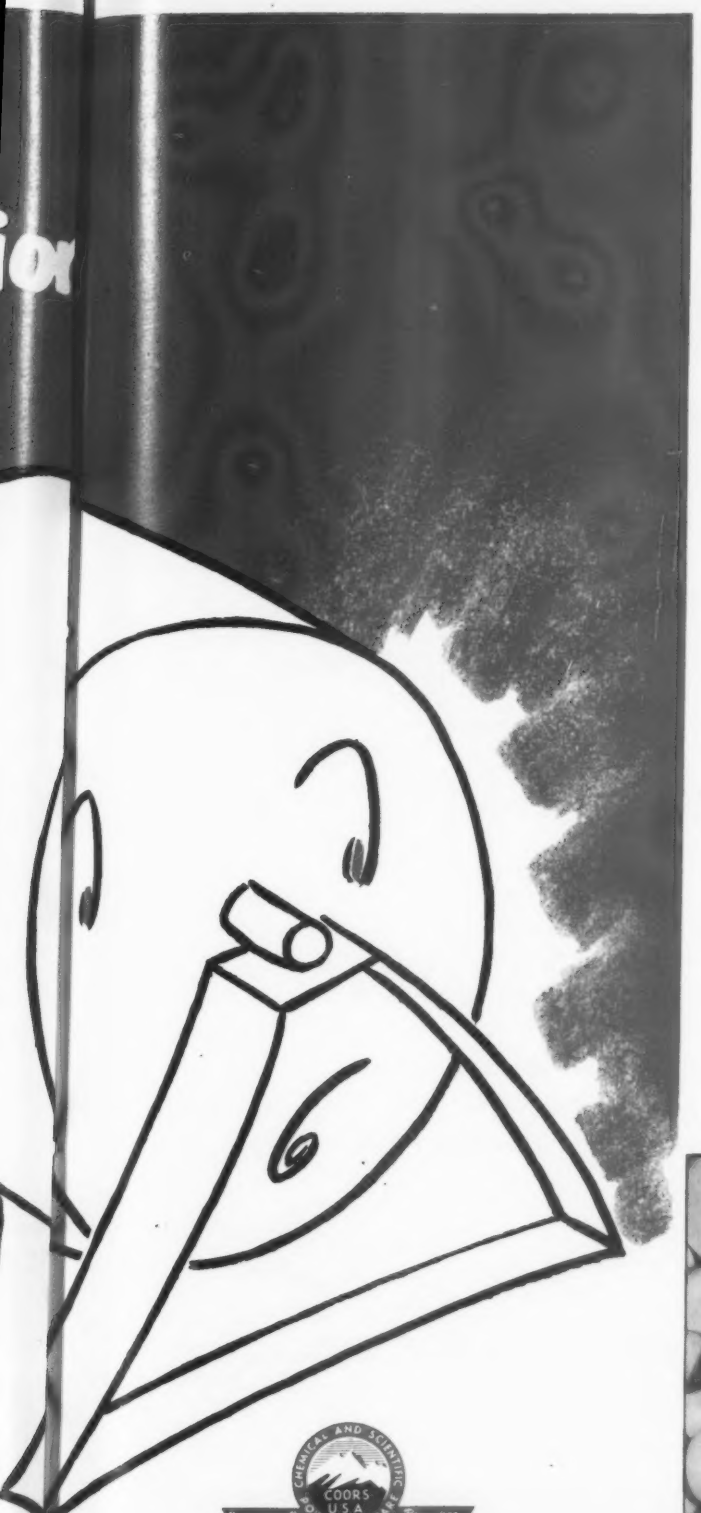

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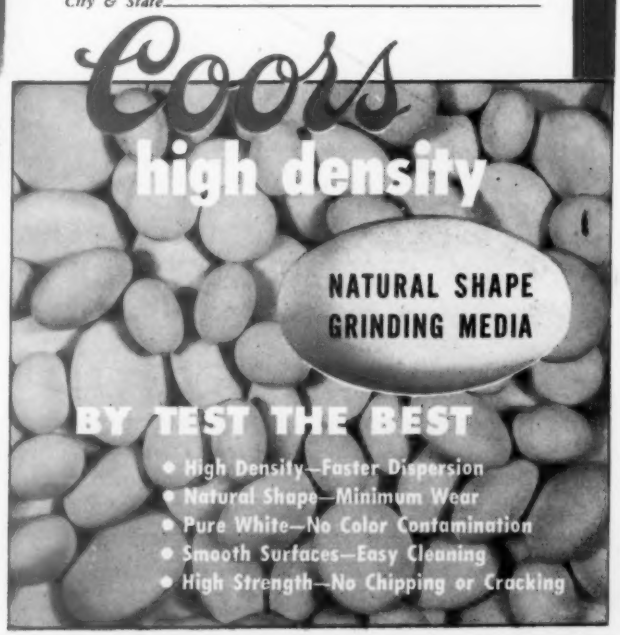

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the chemist's page

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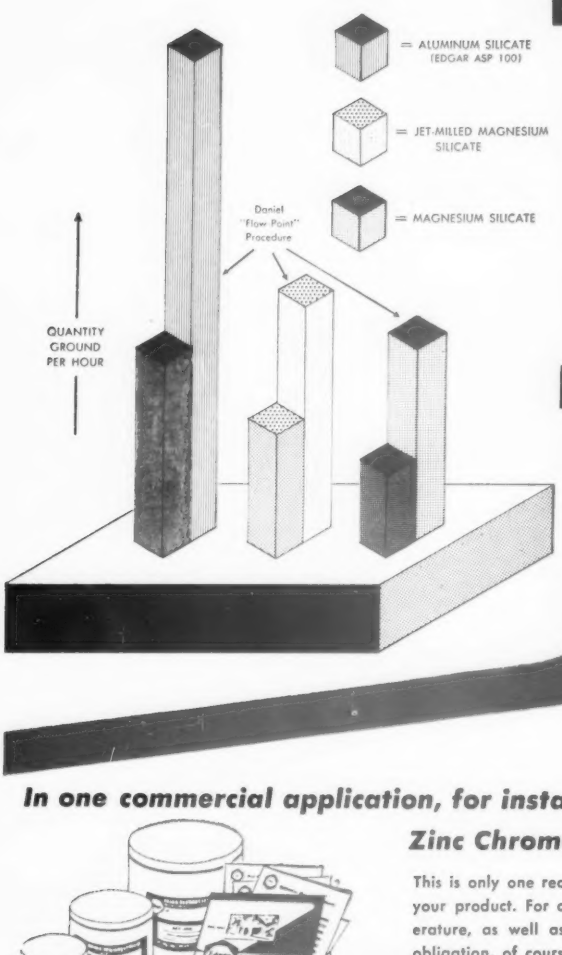
= ALUMINUM SILICATE (EDGAR ASP 100)
= JET-MILLED MAGNESIUM SILICATE
= MAGNESIUM SILICATE
Daniel "Flow Point" Procedure
QUANTITY GROUND PER HOUR

THE FACTS ABOUT THIS TEST:

The test consisted of grinding Zinc Chromate Primer (Government Specification: MIL-P-6889A) in a pebble mill. The length of the bars in the chart to the left shows the quantity of paint ground per hour to the Hegman Fineness required by the specification. In the case of the bars to the front, the charge to the pebble mill was in accordance with the test formula in the specification. For the bars to the rear, the same paint was prepared but the charge to the mill was calculated according to the Daniel "Flow-Point" Procedure.

AND HERE IS HOW IT CAN WORK FOR YOU:

This test, involving one of the most difficult formulations to grind, clearly shows the ease and speed of grinding due to the inherent softness and controlled fine particle size of EDGAR ASPs. EDGAR ASPs are non-abrasive and can be safely ground on a three roll mill even in cases of high pigment loading without risk of abrasive action on the rolls and consequent discoloration of the paint. Though this is just one example of the ease of grinding of EDGAR ASPs, you will find similar satisfying results in other formulations . . . both in reduction of production costs and resultant finer products.

In one commercial application, for instance, grinding time for this formulation of Zinc Chromate Primer was reduced approximately 66%

This is only one reason why EDGAR Aluminum Silicate Pigments improve your product. For complete facts and advantages, send for technical literature, as well as samples for your own laboratory testing . . . no obligation, of course.

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- ⬡ File folder with up to date technical literature
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U.S.I. CHEMICAL NEWS

June ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1953

Change in Cooking Agents Solves Pollution Problem

What is termed by its authors as the "complete answer" to the problem of stream pollution by pulpmill wastes was revealed at a recent technical society meeting. The new process hinges about the use of magnesium bisulfite as the cooking agent in woodpulp production instead of the present calcium bisulfite. In this way, the digester residual liquor (the crux of the present problem) can be satisfactorily evaporated and disposed of by burning. Chemicals can be recovered and used again, and heat from the combustion of the organic matter can be used for the efficient generation of steam and power.

Experiences with a commercial mill set up to study and use the process are said to have definitely established the economic soundness of the idea.

Wounds Show Affinity for S^{35} from Tagged Methionine

Results of recent research with methionine, tagged with radioactive sulfur (S^{35}), are seen as further positive proof that methionine is involved in the healing of wounded tissue. By injecting radioactive methionine into wounded rats, investigators were able to follow the course of the S^{35} through the body. Within five days of injection, they found twice as much radioactive sulfur in regenerating wound tissue as in normal unwounded skin tissue. This concentration continued to increase, with the rate of increase corresponding to the rate at which the wound healed.

Analysis showed most of the radioactive sulfur in the wound tissue to be associated with cystine. In addition, there was more cystine in the wound tissue than in normal tissue. This indicates that scar tissue produced during wound healing is different from normal tissue protein. The experiments showed that most of the sulfur in the regenerating tissue was supplied from the tagged methionine.

Al-Sb New Semiconductor

Scientists recently reported the development of a new low-cost compound of aluminum and antimony which they think may one day compete with germanium and silicon as a semiconductor for transistors, rectifiers, and other electronic devices. The compound is one of a number of combinations of aluminum, gallium, and indium with arsenic and antimony now being investigated for possible uses.

The researchers explain that aluminum-antimony has essentially the same diamond-like structure as silicon and germanium. Work to date has shown that the material can be used to convert light to electrical energy, suggesting its possible use in photo-electric cells. Rectifiers have been made in the laboratory with the material, and transistors are said to be a distinct possibility in the future.

Aroflat Alkyds Found Superior In Controlling Paint Consistency Over All Temperature Changes

Low-Temperature Studies of Viscosity Changes Show Aroflat 3025 And 3050 Unique in Keeping Alkyd Flats Brushable at All Practical Painting Temperatures; Film Properties Also Improved

The solution to an important problem encountered by both manufacturers and users of interior flat paints is seen in data recently made available on viscosity-temperature changes of alkyd-type flat paints and their resin ingredients.

The now common practice of finishing interiors at all seasons of the year, together with the rapid growth in preference for alkyd finishes, has made the relationship between temperature and viscosity in these paints an important consideration. Now, a paint's brushing characteristics and other properties during *cold and warm weather* conditions are as important to its over-all satisfactory performance as its behavior at *normal* temperatures.

Consistency Change Factor the Criterion

The most important change that occurs in alkyd flat paints as the temperature drops is an increase in viscosity. If the viscosity changes rapidly with temperature, the paint is said to have a large "consistency change factor." In a cool atmosphere, such a paint becomes thick, ropey, and difficult or impossible to brush without considerable thinning. And thinning, in turn, reduces the non-penetrating and non-ghosting properties (sheen and color uniformity) of the paint. Temporarily heating the room with space heaters can be resorted to, but practical paint technicians are quick to point out that this does not appreciably heat the wall surfaces. Since paint is applied in a thin film, it cools almost instantaneously on a cold wall, regardless of its temperature in the can. If the paint has a large consistency change factor, it will be almost as difficult to apply as in an unheated room.

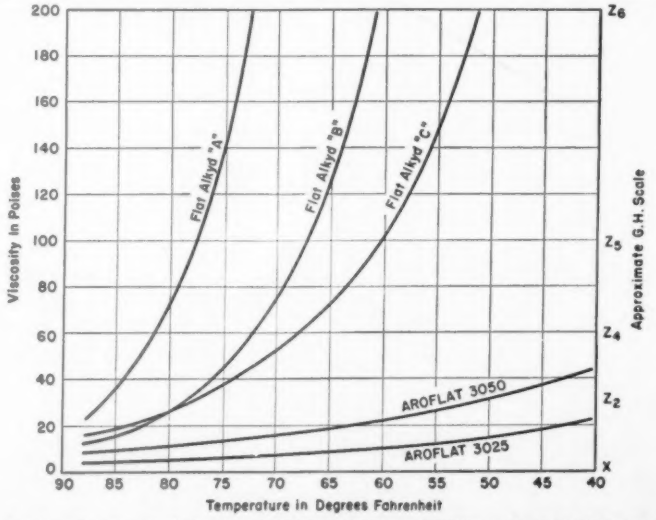
AROFLAT Alkyds Furnish the Answer

In pioneering alkyd resins for better flat and semi-gloss wall finishes, U.S.I. laboratories were aware of these viscosity problems and developed AROFLAT alkyds with unique and inherent qualities to overcome them. Data demonstrating the low consistency change factors imparted to paints by these resins was obtained recently in an independent study which paint manufacturers can verify easily in their own laboratories.

Resin Viscosities Compared

In this study, viscosity determinations were made on various resins at temperatures within and beyond the range likely to be encountered in year-around decorating. U.S.I.'s AROFLAT

MORE



Curves showing the viscosity behavior of AROFLAT 3025 and 3050, contrasted with that of three conventional-type alkyds, as the temperature decreases from 90° to 40° F. The steep curves of the conventional flat alkyd resins mean that paint formulations containing them will be difficult or impossible to brush in cool weather, or after they have been stored in a cool place.

CONTINUED

Viscosity Studies

3025 and AROFLAT 3050 were included, as well as a number of conventional alkyd resin solutions of other companies. All of the resins were tested in the form in which they are offered to paint manufacturers.

The paint on the right is formulated with AROFLAT 3025, that on the left is a commercial flat containing a conventional alkyd. Both were held at 40° F. prior to this demonstration.

Representative curves showing how the viscosities of these resins changed with temperature are plotted below. The flat curves of the AROFLAT resins over the full temperature range offer a sharp contrast to the steep curves of three conventional alkyds, all of which are incorporated in flat paints now on the market.

Paints Show Same Effect

Further tests showed that the viscosity characteristics of these resins carried over into their respective paint formulations. For example, in a comparison of finished paints, all with consistencies of 80-81 Krebs units at 78° F., the AROFLAT formulations increased to only 86-88 units when the temperature was lowered to 63°. Over the same temperature drop, consistencies of conventional alkyd paints jumped to 140 units or more. Most authorities agree that paints with consistencies greater than 100 Krebs units are too thick to apply satisfactorily.

Film Properties Also Affected

Tests on the films of these paints at reduced temperatures, as well as at prolonged elevated temperatures, showed that they lose flexibility in a comparable manner to their sharp consistency changes. Films of AROFLAT paints applied to Morest charts remained flexible at both extremes of temperature while those of conventional paints cracked when the Morest charts were folded.

AROFLATS Yield Fool-Proof Paints

To the paint manufacturer, the results of these tests mean that with the AROFLATS he can formulate his paints to be much more "fool-proof." U.S.I. technicians point out that spring and autumn seasons bring sufficient temperature changes to produce application difficulties. While the summer ahead supplies temporary relief, now is the time to correct any fundamental faults so that stocks on dealers' shelves will not be a source of future trouble during cool weather.

New Rub Test Instrument Seen Aiding Ink Research

Rub-resistance, the property of an ink which preserves the sharp, clean appearance of printed matter throughout its useful life, is becoming more and more important, particularly in the packaging field. To fill the need for a standard test of this property, an independent research organization recently announced the development of what it describes as a new and better portable rub tester.

The characteristic motion of the instrument is planetary, i.e., a one and one-half inch square piece of paper or print is rubbed in a circle at 25 rpm over the print under test while the square piece undergoes a slow rotation of its own. Three pressures are available, and the machine can be set to turn off automatically after 1 to 50 cycles. Test conditions are entirely reproducible. directional effects of the stock are averaged, and the instrument eliminates streaks and deep gouges, it is claimed.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U. S. I.

Gluing operations in confined spaces and on small objects are said to be easier with a line of adhesives now packaged in collapsible tubes with hypodermic needle tips. Adhesives are nitrocellulose, vinyl, and rubber types. **(No. 930)**

The flat, non-divergent, knife-like ribbon of air, water, or steam emitted by a new cleaning nozzle makes it suitable for descaling, de-barking wood, cleaning buildings and equipment, and many other uses, according to the manufacturer. **(No. 931)**

A new chemical resistant lab coat, made of lightweight vinyl fabric, is claimed to be virtually immune to spotting and acid holes, to outlast ordinary lab coats many times, and to retain a neatly tailored appearance through hard wear and launderings. **(No. 932)**

For stabilizing latex emulsion paints, a new dry-form casein has been announced which dissolves easily at the point of use, provides improved viscosity, brushability, mechanical ability, and helps prevent hardening of paint pigments. **(No. 933)**

New stainless steel-vinyl plastic coatings, now available in all colors, are said to be impervious to moisture, resistant to most chemicals, quick-drying, and capable of withstanding constant dry heat up to 300° F. **(No. 934)**

Clear, clean ice flakes, freed of sediment and trapped gases, can now be made directly in the laboratory with a fully automatic machine which produces up to 300 pounds of ice daily. Ice is said to remain flaky for days if kept in an insulated bin. **(No. 935)**

A new molybdenum-base lubricant in the form of an enamel can be applied "on any type of surface including plastics, glass, and ceramics" to yield a thin, hard coating which is greasy-feeling but clean, the manufacturer states. **(No. 936)**

Spot determinations of pH to within one-half a unit over the full pH scale can be made, it is claimed, with a series of six new indicator papers with color scales printed on the containers. **(No. 937)**

A new fire blanket for labs and homes is made of plastic-coated glass cloth, weighs two and one-half pounds, is resistant to acids, alkalies, and most solvents, and stays flexible in below zero temperatures. **(No. 938)**

New plastic acoustical ceiling tile, lined with fiber glass, is said to be easy to apply by the home owner or industry, to be easily cleaned, and to be stain-, peel-, and chip-proof. **(No. 939)**

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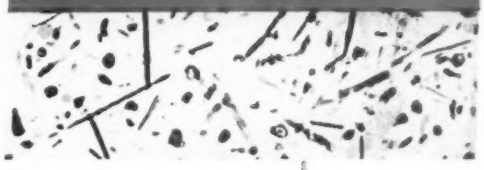
AZO ZZZ-22

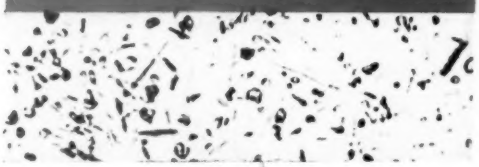
A high oil absorption Zinc Oxide having large Acicular Particles which gives heavy body



medium

AZO ZZZ-11

A medium oil absorption Acicular Zinc Oxide imparting exceptional weathering qualities to exterior paints

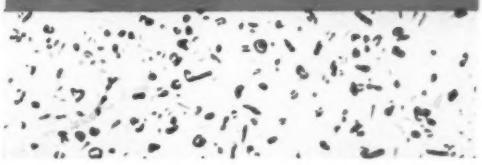


AZO acicular lead-free zinc oxide is a superior pigment available in a wide range of oil absorptions

low

AZO ZZZ-33

A definitely Acicular type with a lower oil absorption, but chemically identical with AZO ZZZ-11 and AZO ZZZ-22



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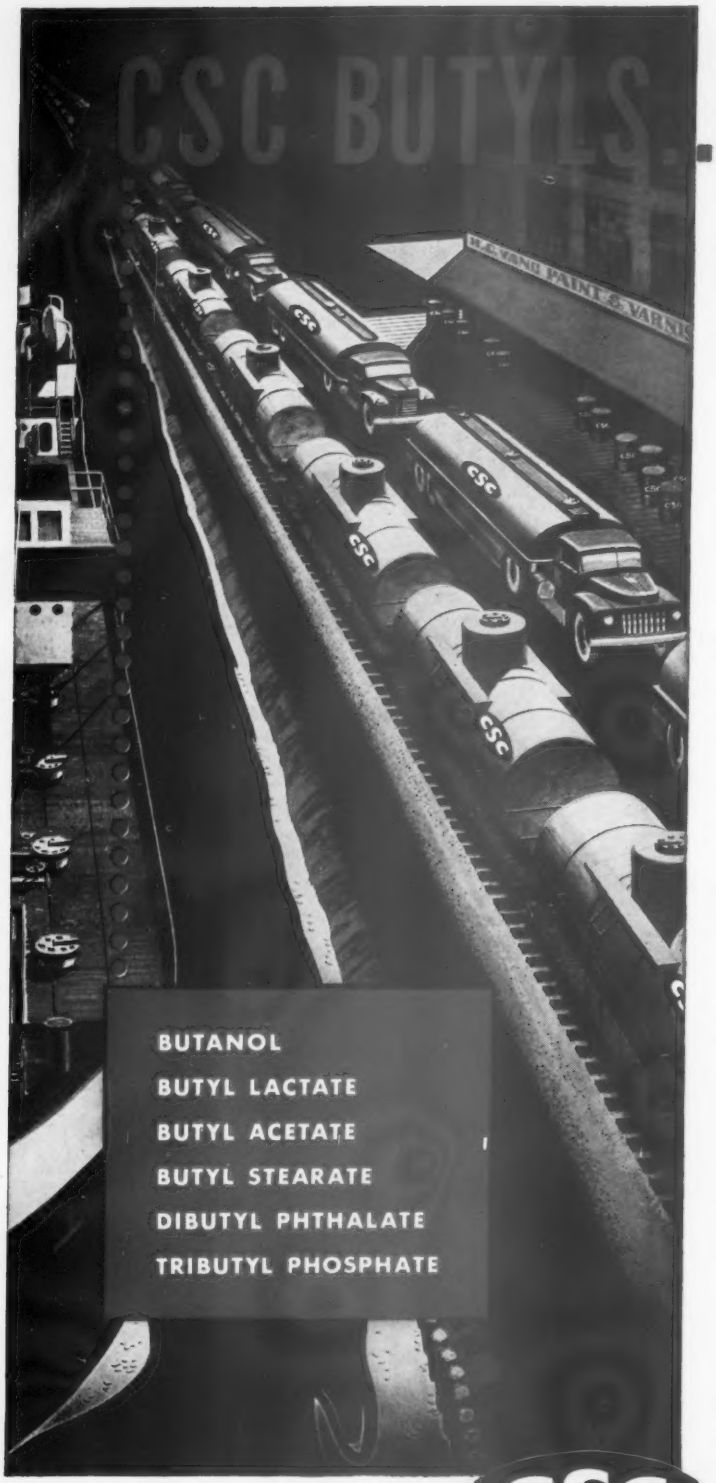

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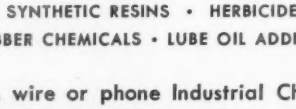

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Organic Protective Coatings for Metal Cans

By S. L. FLUGGE
Research Division
Continental Can Co.

MOST metal cans are made either from steel plate or steel plate with a very thin coating of tin or terne metal. The so-called tin plate carries a coating of tin which may vary from approximately 0.000015 inch to approximately 0.000100 inch in thickness depending upon the grade being produced. Terne plate carries a coating consisting of about 85% lead and 15% tin and its thickness varies from approximately 0.000050 inch to approximately 0.001 inch, again depending upon the grade being produced. Plain steel has relatively little resistance to corrosion but the tin and terne coatings provide the steel plate with increased resistance to atmospheric and product corrosion. Organic protective coatings are used to increase the corrosion resistance not only of steel cans, but also of the tin or terne plate cans. Such organic coatings are particularly useful for canned products which adversely affect the metal or metals in the can or are adversely affected by the metal. Organic coatings have made it possible to pack satisfactorily a large variety of products in cans.

Restrictions on the use of tin have accelerated the development and use of thinner tin coatings and in many instances the complete elimination of tin. In both cases organic protective coatings often are called upon to provide the necessary protection either as a supplement to a reduced metallic coating or as a substitute for it.

Although many organic protective coatings give satisfactory results over plain steel plate when used for dry or non-aqueous products, they usually fail when used on the inside of steel containers packed with aqueous products. Chemical treatments for steel plate have been developed to provide an inorganic film that permits better adhesion of applied and baked organic coatings especially under aqueous conditions. In some ways this chemical treatment may be considered as a primer or prime coat and in fact some of the thinner electrotin coatings which may be used in the future might also be considered as prime coats in that they offer relatively little protection by themselves, but in conjunction with a subsequently applied organic coating they become an important part of a good protective system.

Can Linings

THE protective coatings used for metal cans are similar to those used for numerous other purposes. Although many attempts have been made to develop a "universal" or all-purpose protective coating for cans, these attempts have not been successful and from 10 to 20 different protective coatings may be required to meet the exacting and diverse requirements of the many products now packed in cans. These various coatings include the oleoresinous, the vinyl, the so-called

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This paper was presented at the meeting of the mical Institute ofCanada, Montreal, P.Q., ada, June 3,1952. Permission to publish this er was granted through the courtesy of the mical Institute of Canada and "Chemistry in ada."

Parts of the subject of this paper were previously ered in a paper entitled "Can Linings" presented he American Chemical Society Meeting in Bos-, Mass. in April 1951, and published under the e title in Continental Can Co., Inc. Research lletin No. 23-1951.

phenolic and the wax types. The broad term "can linings" has been used to cover this large group of protective coatings but since some of them are used on the outside as well as on the inside of cans this term is not completely inclusive. Except for the waxes the terms lacquers and enamels are widely used in the can making industry to describe the above protective coatings.

Oleoresinous

The can linings in use about twenty years ago consisted of a few oleoresinous enamels. These enamels were made with natural resins or ester gum, tung oil, driers and thinner, in much the same manner as the varnishes that were made for other purposes. Lead driers were avoided because of the toxicity of lead and the amount of drier was somewhat lower than that of air drying varnishes because the can linings were baked at about 375°F to 400°F for a total period of from 20 minutes to 30 minutes depending upon the efficiency or effectiveness of the oven.

Some of the oleoresinous can linings now in use are quite similar to those originally developed and a few actually may be the same. However, in many of the newer formulas synthetic resins have replaced the natural resins and ester gum. Also, dehydrated castor oil may have replaced the tung oil in some formulations. Many types of synthetic resins have been tested in oleoresinous can linings and those that have been found satisfactory for at least limited use include the phenolic modified rosin esters, the maleic modified rosin esters, the unmodified phenolics, the petroleum resins and the epoxy type resins. The ureaformaldehyde and related resins have found only rather limited use as inside enamels for cans for aqueous products although they are used extensively for certain purposes on the outside of cans particularly where a clear, colorless finish or a white pigmented coating is required.

Tung oil has properties which make it well suited for many oleoresinous can linings. It cures rapidly, and imparts good "resistence" or "durability" to a baked oleoresinous film. It also has good flavor and odor characteristics if properly baked. Linseed oil and other drying oils were sometimes used in outside enamels, but rarely in inside enamels because of their inferior odor and flavor characteristics. Occasionally small quantities of these oils have been used with tung oil for specific purposes, but tung oil was the principal or only oil used in most oleoresinous can linings before World War II. Because of the restrictions on the use of tung oil at that time extensive research on all available substitutes resulted in the development of a number of oleoresinous finishes based on dehydrated castor oil. These new finishes were found to be satisfactory substitutes and were particularly suited for use over chemically treated steel plate.

Although many of the original oleoresinous enamels were of the so-called long oil type, the newer formulations generally call for from about 12½ to 25 U. S. gallons of oil for each 100 pounds of resin; that is, from a ratio of 1 to 1 of oil to resin to a ratio of 2 to 1 (oil to resin).

If tung oil is used it must be adequately cooked or treated to prevent gas-checking when the film is baked. Gas-checking inhibitors are effective in eliminating or minimizing gas checking but since they may also have an adverse effect on flavor characteristics and may have a questionable toxicity rating, any such material must be very carefully evaluated and proved as completely non-detrimental before it is used in can linings. In developing a new formulation it probably will be cheaper and quicker to obtain gas-proofness by proper formulation and cooking than by the addition of inhibitors.

If ordinary oleoresinous can linings are used for foods containing appreciable quantities of protein such as corn, peas, meat, fish, etc., a black tin sulfide stain will form under the enamel and under certain conditions a voluminous iron sulfide will form at small areas of iron exposed at scratches and fractures. To overcome this condition oleoresinous enamels used for such products contain about 15% of a fine particle size zinc oxide. This zinc oxide is added for its chemical reactivity and not as a pigment to make the film opaque. In fact, its fine particle size which is necessary for maximum chemical reactivity results in very poor hiding power. The sulfides which form during the processing or heat sterilization of protein-containing foods react with the zinc oxide to form white or essentially colorless zinc compounds whereas without the reactive zinc oxide, the sulfides would react with tin and iron to produce black sulfides, which are undesirable from an appearance standpoint.

Can linings containing zinc oxide were first developed for corn cans and were called "corn enamels". Since the use of these enamels was soon extended to include other products they were called C-enamels.

The unpigmented can linings were often called "regular" enamels or R-enamels. More recently however, with the increased number of protective coatings being used, they are generally identified by a number, letters, or a combination of numbers and letters.

The zinc oxide used in can linings obviously must be of the "lead free" type and should be ground into a suitable vehicle. Often the enamel itself may be used as the grinding vehicle but it is generally preferred to use a specially formulated material compatible with the enamel with which it is to be mixed. Small quantities of fatty acids facilitate grinding but it should be remembered that appreciable quantities of linseed oil in the formulation may result in inferior flavor characteristics.

The zinc oxide paste is generally mixed with the enamel shortly before use especially if there is a tendency for the mixed "C-enamel" to increase excessively in viscosity. However, certain "C-enamels" are quite stable and the principal precaution necessary in their use after mixing is to be certain that any zinc oxide that settles out during storage is thoroughly reincorporated throughout the mass of enamel when it is used.

Phenolics

The phenolic type enamel (phenol-formaldehyde type without oil modification) is characterized by greater impermeability and chemical resistance, considerable sensitivity to plate conditions, a minimum of flexibility and a tend-

Magnetic Coating machine coats black iron sheets on one side with lacquer. Background shows oven through which sheets are conveyed for baking finish.

ency to impart a characteristic flavor to certain products. Improvements have been made in the flavor characteristics of these enamels in recent years so that their use has been gradually extended. Also improvements in adhesion and flexibility have been achieved. As would be expected the permeability of the phenolics is much less than that of oleoresinous enamels and this characteristic makes it possible to use them at low film weights in the range of about 2 milligrams per square inch. At higher film weights the films do not withstand fabrication so well. Because they may be used at these relatively low film weights, the phenolic enamels often cost less on a final basis of cost per can even though their cost per gallon may be higher than other enamels. Baking temperatures and time vary depending upon the formulation but in general the phenolics cure more rapidly than the oleoresinous enamels.

The relative inertness and impermeability of the phenolics makes them well suited for many industrial products and also for meats, fish, etc., because a good phenolic film will prevent staining of the plate without the use of zinc oxide.

Vinyls

The vinyls are characterized by their toughness and freedom from flavor and this makes them well suited for cans for beer and other products that are sensitive to metal and readily pick up off flavors. However, the vinyls are also characterized by their relatively poor resistance to steam which limits them largely to containers for products which are processed or heat sterilized at about 200°F or lower. Also, the vinyls usually require modification or are applied over a base coat or primer since when used alone their adhesion to metal is poor. Furthermore, even though their heat stability may be improved by modification with other materials, the vinyls cannot be used in the side seam area of the can before soldering because at soldering temperatures the vinyl film decomposes or chars excessively.

By suitable addition of pigments or aluminum powder the blush that results when vinyls are subjected simultaneously to water and temperatures above 200°F may be minimized or made entirely invisible. Such films not only have a satisfactory appearance but also have given good results with several different processed products. The vinyls are relatively new and although large quantities are already used for beer cans, their use probably will expand as better formulations are developed. Also some progress has been made in the development of modified vinyls which have improved heat resistance and process resistance.

Wax Type

The wax type can linings are used principally for lining crown closure type cans after they have been assembled. Microcrystalline petroleum waxes or special wax blends are heated above their melting point and forced into cans inverted so that the excess may drain out. The final film is formed by the solidification of the wax film. The use of such wax film is limited.

With the exception of the wax type, the protective coatings used on metal cans are made with sol-

vents and diluents for suitable application. In addition to the general rules and practices followed in employing solvents and diluents for varnishes and enamels, solvents and diluents for can linings must be volatilized during the baking or curing operation and must leave no residue which might cause odors or flavors.

To be acceptable as can linings, organic protective coatings must be:

1. Non-toxic and free from flavors and odors which would adversely affect the quality of the products to be packed.
2. Resistant to the products and provide the required barrier between the product and the metal of the can.
3. Readily applied and rapidly cured on various types of commercial can making plate or can structures.
4. Resistant to the mechanical action to which they will be subjected during can making operations and subsequent use.
5. Economical.

Characteristics Desired

ONE of the most important characteristics of a food can lining is that it be non-toxic and free from odors and flavors which might be imparted to the canned product. Can linings now in use have been formulated with materials which have been tested extensively and evaluated for their effect on canned products. Many of them have been used for a great number of years as can linings and similar purposes without any toxic effects or objectionable odors and flavors. In the United States the Quartermaster Corps also requires that any protective organic coatings used either on the inside or the outside of food containers for the Armed Forces be approved from the standpoint of toxicity by the Surgeon General's Office. This approval applies to special protective coatings such as the camouflage enamels and also to the regular can linings used for cans for civilian canned foods which later are to be purchased for the Armed Forces.

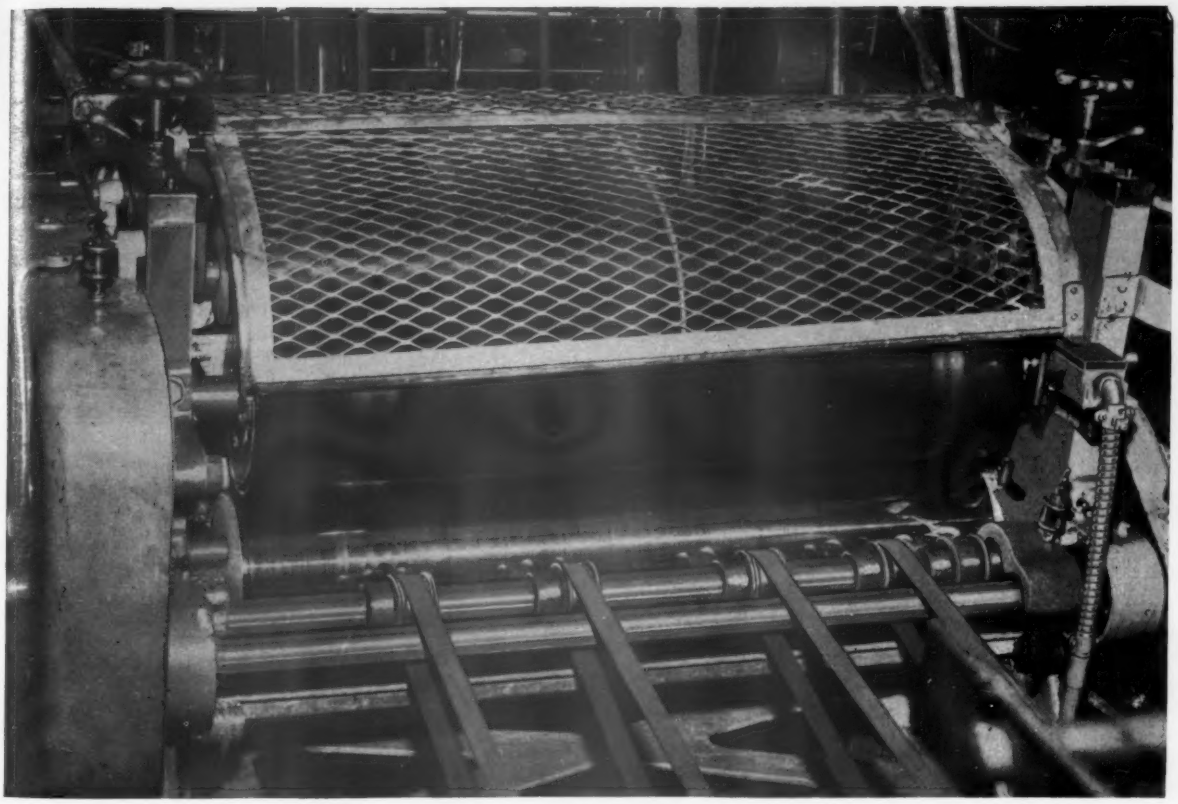
The Bureau of Animal Industries of the United States Department of Agriculture also passes upon the suitability of protective coatings which may be used to line containers for meats, meat products, lard and similar edible animal products. There are indications that this type of control will be extended in the future. A considerable amount of work already has been done on evaluating can lining materials for toxicity characteristics but more and more new materials for protective coatings are being introduced and these must be evaluated too, before they can be used. Opinions differ regarding the type and amount of testing required to evaluate satisfactorily the possible toxicity characteristics of a new material but even the more moderate tests are quite expensive and time consuming. However, assurance that the can lining is non-toxic certainly is necessary and is obtained for every inside can enamel.

In the development and evaluation of an inside enamel for cans, flavor testing justifiably receives great attention. Flavor testers must be able to detect flavors qualitatively and quantitatively, and also to evaluate the significance of flavor test data. The flavor of every product is affected to some extent by the container in which it is packed. After a period of time, consumers become more or less accustomed to the flavor which may be associated with a specific type of container and may reject as unsatisfactory, many other containers. As an illustration, enamel linings have been accused of imparting an "enamel flavor" to some products normally packed in plain tin cans. Generally, tomato juice packed in plain cans is preferred from the standpoint of flavor to the same juice packed in enamel cans. By coincidence, it appears that this preference of the tomato juice from the plain can is related to the presence of small amounts of tin dissolved from the container, or perhaps to the reducing action of the plain tin surface on the tomato juice. However, sufficient evidence to prove the reason for the beneficial flavor effects of the plain can to the satisfaction of all concerned is not available.

When tin is exposed to some food products a bleaching action occurs. Although this is very objectionable with many products, such as the red fruits, and is avoided by the use of a suitable can lining, there are instances when this bleaching action is desirable. This is particularly true with the lighter colored products such as grapefruit juice and grapefruit segments and sauerkraut. The slight bleaching action keeps the color light and compensates for the normal darkening effect which may result from the processing or sterilization. Peaches and pears packed in cans completely enameled inside will be found to be somewhat darker in color and slightly different in flavor than the same products packed in cans wherein appreciable areas of plain tin are exposed. Even though some individuals may prefer the slightly darker color and the different flavor in peaches packed in all enameled cans, it is doubtful if such cans will be produced under present conditions because the presence of an appreciable area of plain tin greatly increases the shelf life of this canned product.

An all enameled can will have under present manufacturing conditions all but a few very small areas covered with the enamel. As previously reported by several authors, corrosion attended by the formation of sufficient hydrogen to displace the vacuum normally found in packed food cans and actually cause the ends to "swell", may result in much less time in enameled cans than in "plain" or partly plain cans. In some cases the corrosion may be so confined to localized areas that the can may be perforated by one or more "pinholes". It is not the intent to go into detail on the phenomena of can corrosion, but it was thought important to mention that contrary to some lines of reasoning, not all corrosion problems can be eliminated by the use of can linings as now available.

An important factor to be borne in mind is that the can lining or enamel may not be evaluated alone but must be considered in conjunction with the plate to which it is applied. Steel, terne and tin plate may carry a small quantity of palm oil, cotton seed oil or perhaps dibutyl sebacate which acts to some extent as a lubricant and on steel plate as a protection against atmospheric corrosion. Can linings should cover commercial quality plate in a uniform film without the formation of



Metal sheet coater showing rollers which apply coating material to flat sheets.

"enamel eyes", those areas around some small nuclei about which most of the enamel has drawn away. Can linings must not be too sensitive to varying degrees of oxide on the plate surface. Oxide films are present on all plate but vary both qualitatively and quantitatively. Usually, excessive oxide films lower the adhesive characteristics of the enamel films to the base plate. This may be due to the relative adhesive characteristics of the film to various oxidized surfaces, the lower adhesive characteristics of the oxide film to the plate, or to the effect that the oxides may have had on the cure of the film. It is well known that hardness, adhesion, flexibility, chemical resistance and other properties vary with the degree to which the film is cured and the cure is a function of the time and the temperature of the bake. It may be less well known, but equally true, that the surface to which the film is applied and baked over a sheet of "old" tin plate half of which had been electrolytically cleaned to remove the heavy film of oxide. The enamel over the heavily oxidized area was cured to a greater degree than that over the cleaned area and this difference was equivalent to approximately that which is obtained by a 400°F as compared to a 380°F bake. This enamel is too sensitive to variations in surface oxide for satisfactory commercial production but illustrates the catalytic effect the plate surface may have on the curing processes during baking.

At this point it may be well to explain that the adhesion requirements of food can linings must be considered to meet two different conditions. The fabrication of the enameled plate into a can produces strains in some areas of the plate which may cause loss in adhesion and sometimes peeling of the enamel film. This type of peeling is familiar to the industry and is caused by physical distortion of the base metal. In addition to this more well known type of failure loss of adhesion or peeling also may occur on the inside of enameled cans packed with certain products even though the areas in question have been subjected to little or no stress. This latter type of peeling is dependent upon and accelerated by the presence of water and oxygen. Thus, under unfavorable conditions this type of peeling may be observed in the headspace above the product in the can. Several accelerated tests are available to measure this type of loss of adhesion but for final evaluation of can linings experimental cans must be made for processing and storage tests.

Application

MOST can linings are applied to flat sheets by means of roller coaters and baked in continuous ovens. The resulting enameled plate is then made into cans. The manufacturing operations involve considerable bending, drawing and forming of the enameled plate at certain areas and, in passing along from one step of an operation to another at high speed, many areas are subjected to frictional forces. To withstand these operations satisfactorily, can linings must have several types of

resistance. They must be scratch and abrasion resistant and still be flexible and adherent to the metal plate. Most can linings must also be resistant to the heat required for the soldering operations.

Some can linings are applied by spraying on cans or component parts thereof. By applying the protective coating after at least some of the more severe mechanical operations of can making have been completed, scratches, abrasions and fractures are minimized and a more efficient barrier between product and metal is obtained. The spray method of application of enamel films was first used extensively in the manufacture of beer cans. Indications are that this means of applying can linings will continue to expand.

An interesting use of the spray application of protective coating is the so-called side striping operation. Most can bodies have a soldered side seam and the side seam area is subjected to considerable mechanical strain, and to the action of soldering flux at temperatures of 600°F to 700°F. Even though the time interval at these high temperatures is a matter of a few seconds at most, it is obvious thay any protective coating applied to plate before the side seam is formed will show some failure. One coat of sprayed enamel or lacquer applied after soldering results in considerable improvement but, because of the edges with small radii inherent to the side seam structure, two coats are required where maximum coverage is required. These requirements have led to the development of a striping operation which applies a sprayed stripe on the inside of the can body over the side seam area before the can body is discharged from the side seamer. In some installations the side seam is cooled appreciably but in others the inside stripe is applied to the hot side seam where surface temperatures may be as high as 600°F. The latter method has one advantage in that the solvents are removed rapidly and with phenolic or oleoresinous materials some degree of cure is obtained without the use of additional drying or curing ovens. The outside of side seams also may be striped to provide a greater degree of protection against corrosion or rusting. For both inside and outside striping materials with very rapid drying or curing rates are required.

It is desirable to use can linings which possess a reasonable degree of latitude in film weight and bake so that failure will not result if the specified film weight and bake are not followed exactly. The roller coating machines and the spraying machines used to apply linings provide means for close control of film weight. The films, of course, are relatively thin, being in the neighborhood of 0.0001 to 0.0005 inch thick or having a weight of from approximately 2 to 6 milligrams per square inch. Control limits generally allow for film weight variation of $\pm$ 0.5 milligram per square inch from the specified value.

Baking temperatures generally are not higher than 425°F plate temperature. Control of temperatures in modern continuous sheet enameling ovens has improved greatly over the past few years and tolerances of $\pm$ 5°F from the nominal temperature can be maintained after the plate has reached its baking temperature. Older ovens do not control temperatures as well and there may be considerable difference between the maximum and minimum temperature at a given time on any one sheet during its travel through a large part of the oven. This condition is particularly true when the speed of the oven has been increased over that for which the oven was originally designed or used.

The use of can linings has increased continuously not only because of the increase in can production but also because a greater percentage of the cans produced are being lined with organic protective coatings. As a result, enameling facilities often have been inadequate. This fact, and the ever present competitive incentive, have resulted in continued pressure to shorten the baking time and thereby increase production. About 30 years ago the time required to bake a can lining was almost an hour. About 20 years ago the time was reduced to about 30 minutes, and at present the total time in the best ovens is somewhat less than 15 minutes. As indicated, the reduction in baking time has been made possible by the use of higher temperatures and better control of temperature which permitted bringing the coated plate or unit to the baking temperature within about two minutes and maintaining this selected temperature within $\pm$ 5°F until the plate or unit left the oven.

The maximum baking temperature for enameled tin plate has been maintained somewhat below the melting point of tin (approximately 450°F). This has been done not so much because the melting of the thin tin coating would be objectionable, but because any exposed areas of tin plate (uncoated areas for soldering or the reverse side, if bare) are apt to be oxidized or be discolored excessively when temperatures approaching 450°F are used for an appreciable portion of the baking time.

Economic Considerations

EXTENSIVE testing is necessary to provide the facts required to approve a new enamel for cans for each specific product. Even if the new protective coating is to be used only on the outside of cans, it is still necessary to evaluate it carefully to determine its ability to withstand all of the mechanical operations to which it may be subjected during can manufacturing and then provide protection to the container throughout its life. For protective coatings to be used on the inside of containers the testing is much more involved because flavor, odor and possible toxicity characteristics must also be determined.

Some relatively fast preliminary or screening tests have been developed but extensive evaluation under commercial conditions is required before protective coatings for metal cans can be approved for use with the necessary degree of assurance. Generally, a representative commercial lot of liquid enamel must be made, applied, cured and evaluated in the form of finished cans which are packed with various representative products and examined over a period equivalent to the expected life of the packed container. As previously indicated, the testing of enamels for the outside of the cans require somewhat less time than

(*Turn to page 79*)

PE PROCESSING

STRAIN GAUGE MAKES AUTOMATIC CONTROL POSSIBLE

PENTAERYTHRITOL was first synthesized by Tollens back in 1891 by the reaction of acetaldehyde and formaldehyde, with the latter being in large excess, in the presence of calcium hydroxide and large amounts of water.

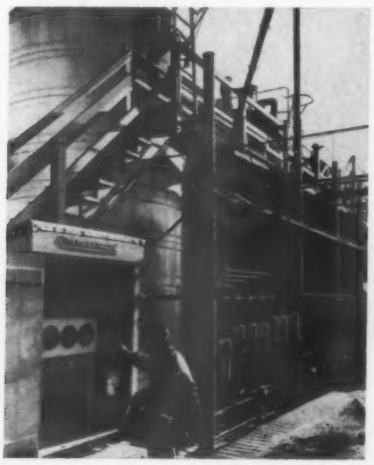
Commercial production of pentaerythritol took place during the early 1930's in this country, and the main uses of pentaerythritol were in the manufacture of explosives and the synthesis of organic esters useful in resins and in oxidizing oils for coatings.

Uses

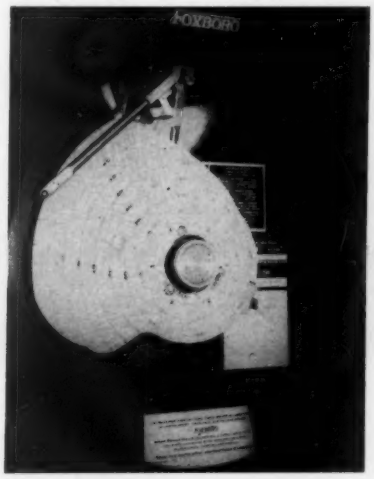
It was not until 1939 that a technical grade of PE was offered at a price to fit the economics of the resin and oil markets. At that time, the coatings industry began to consume substantial amounts of PE in the production of their resins and drying oils.

It is interesting to note that one of the factors which contributed to the increasing use of PE was the unavailability of Chinawood oil during the Sino-Japanese war. As a result, American varnish makers were forced to use domestic and South American oils. They found that PE resins could be processed with these oils to

Strain gages essentially like the load cell shown above are used for automatic, continuous weighing of the acetaldehyde by remote control.

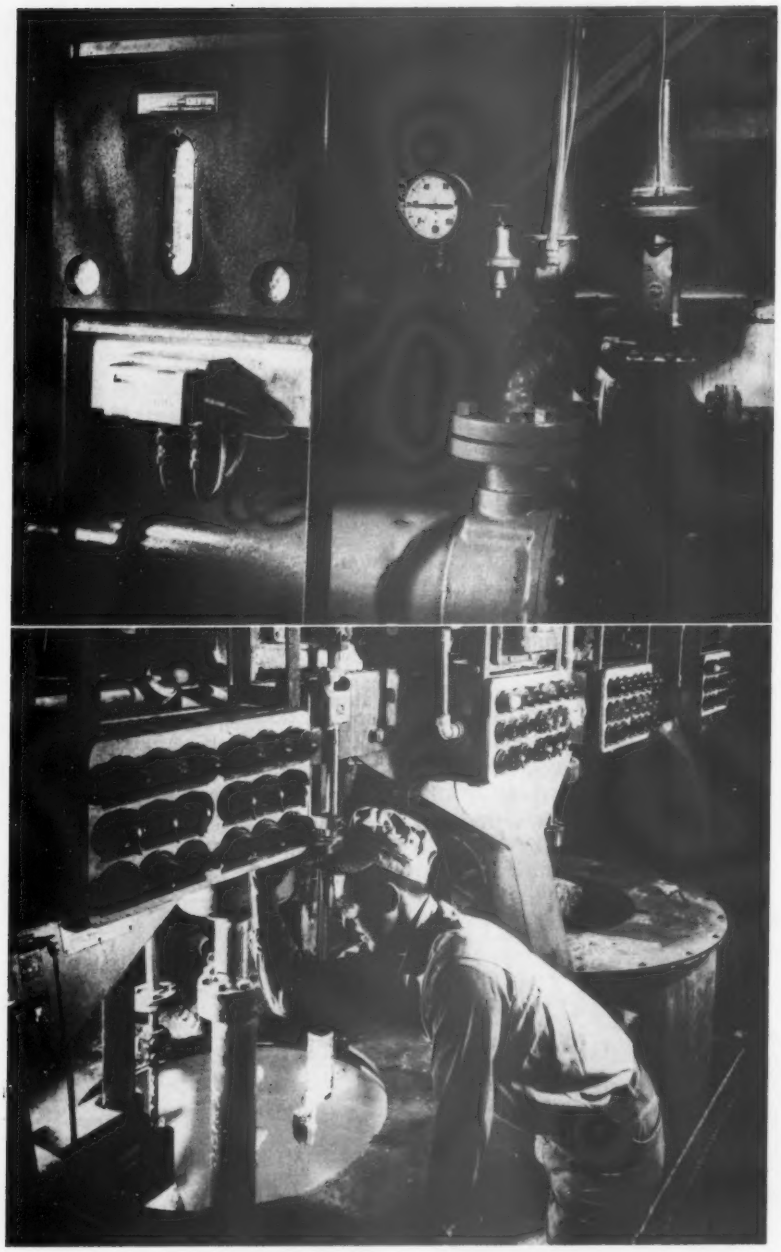


The above photo shows the transmitting station for liquid level of formaldehyde in stainless steel storage tanks as shown in the background.



Final step was the use of cams, cut from ideal rate-of-flow curves to control the raw-material feeds automatically, as shown in above close-up.

Remote indicators and controls govern the rate of flow of the reagents. The above photo shows heat exchanger and remote-reading rate-of-flow indicator for automatic feeding of acetaldehyde.



Automatic centrifuges separate the crystals of pentaerythritol from the mother liquor. Push button starts the cycle, which ends with the pentaerythritol being plowed onto a conveyor.

make coatings comparable in performance with most of those that formerly contained Chinawood oil. Meanwhile, the production of other types of resins, particularly alkyds, and of synthesized drying oils based on PE, was undertaken by a number of firms.

There are many types of resins wherein PE is used. In modified rosin-bearing resins, it can be used with a variety of drying oils to produce quick-drying varnishes. In alkyd-type varnishes, it imparts fast drying, good water resistance, and high luster.

Another factor which has accelerated the adoption of PE in the protective coating industry is cost. With the price of glycerine considerably higher than PE, it is natural that there has been a real incentive to replace glycerine with PE.

Therefore, the principal market today for PE is in the manufacture of alkyd resins, rosin esters, and synthetic drying oils.

Automatic Control

In an effort to improve the quality and reduce the cost of PE, the *Hercules Powder Co.*, a major producer of this material, in cooperation with the *Foxboro Co.*, has succeeded in this endeavor by utilizing entirely new concepts in automatic control.

The experimental installation of a strain gage to facilitate the remote handling of a potentially dangerous raw material was the beginning of a study that resulted in the complete instrumentation and control of a whole chemical operation.

A strain gage works because the electrical conductance of a metal varies as it is extended or compressed. Advantage is taken of this fact so that the device can be used to measure stresses, indicate weight as little as 1 part in 10,000 or to actuate process control mechanism.

This is not the story of strain gages, but rather how the search for a means to simplify an operation resulted in a plant under complete instrument control.

At Hercules' Mansfield plant, acetaldehyde is one of the raw materials used in the manufacture of pentaerythritol. It has a low

vapor pressure (boils at 21°C.), low flash point, and in general is a tough material to store and handle safely.

In the early days of the operation at Mansfield, the acetaldehyde was stored in tanks under pressure. The tanks were located at the far end of the plant area. The distance was adequate for safety, but it meant a long trip for the operator who, before each reaction, went to the storage area to weigh acetaldehyde into smaller tanks to be charged to the operation. As the plant was enlarged and pentaerythritol production schedules substantially increased, it meant more frequent trips for weighing, more time out, more chances for error in weighing and recording.

Remote Control Weighing

The search was started for a satisfactory method of remote control weighing. A number of the plant staff learned of work the Foxboro Company was doing with load cells or strain gages then being used for weighing in bombers in Air Force operations. Foxboro engineers were interested — the Mansfield plant became a guinea pig. Soon the first peacetime experimental model strain gage was installed and weights were transmitted and recorded on a dynalog in the plant.

This was the beginning of a planned attack in the long felt need for automatic process control and recording.

Step by step Hercules and Foxboro engineers worked to bring additional operations under instrument control. Material handling reaction conditions, evaporator performance intermediate operations finally were governed by what's under the direction of an operator in a control room. Permanent records meant added information for the production and quality control engineer and better quality for Hercules' customers.

Thus, what is believed to be the pioneer application of strain gage weighing in the process industries to weigh a tricky raw material developed into a full scale automatically controlled operation for the manufacture of pentaerythritol.

This is the general view of the control room showing instrumentation (switches, motor controls, signal lights, indicators, recorders, and the cam controllers) as finally developed.

All phases of the reaction involved in the manufacture of PE are controlled by above panel. Operator has clear view of reactor (background) and two-way communication with all plant areas.

North Dakota College Presents Beginners' and Advanced Paint Courses

A Beginners' paint course will be given for the sixth time at the North Dakota Agricultural College, Fargo, N. Dak.

The two week paint course, scheduled from June 15 to June 26, will be taught in its entirety by Dr. Wouter Bosch, Professor and Chairman of the Department of Paints, Varnishes and Lacquers.

No entrance requirements are needed for the course, composed of twenty lectures, ten discussion periods and ten laboratory sessions. The program is listed in detail below.

From July 6-17, North Dakota's College of Agriculture will conduct an advance paint refresher course.

The purpose of this course is to acquaint experienced men with the latest developments in the fields of oils, resins, pigments, solvents, driers, etc.

Entrance requirements for the course are two years of industrial paint experience; a B. S. in chemistry with one year of industrial experience or the successful completion of any of the beginner's paint course conducted by the Department.

Dr. Wouter Bosch will moderate the course in addition to giving some of the lectures. Fifteen guest lecturers will participate in the refresher course. Program details are listed below.

Beginner's Course

There will be twenty lectures, lasting 75 minutes each, covering the following:

1. Chemistry, modifications and usage of drying oils.
2. Occurrence, modifications and applications of rosin, tall oil and natural resins.
3. Chemistry, properties and applications of synthetic resins, as phenolic, alkyd, urea, maleic, vinyl resins.
4. Miscellaneous film forming materials and their usages;: cellulose nitrate and acetate, shellac, casein.
5. Composition, properties and usage of white, colored and extender pigments.
6. Composition, properties, and usage of solvents, thinners and driers.
7. Discussions on varnish cooking and the various procedures used.
8. Pigment dispersion and discussions of many factors that influence same.
9. Principles of paint and varnish formulations.
10. Practical discussion on various means of paint and varnish applications.

There will be ten laboratory sessions of three hours each, covering the following:

1. Determinations of color and viscosity of various oils and treated oils; choice and influence of driers.
2. Preparation of varnishes from rosin and rosin derivatives; studies on the solubility of some natural resins in oils and solvents.
3. Student cooking of a 40-gallon ester gum varnish, a high grade spar varnish and preparation of an alkyd resin varnish.
4. Comparison of the above varnishes with regard to color, drying time, elongation, hardness, etc.
5. Grinding of a white enamel undercoater on a Hy-R-Speed mill.
6. Grinding of a white enamel on a single roller mill.
7. Grinding of a high quality trim paint on a triple roller mill.
8. Determination on the above paints of: Drying time, gloss, pounds per gallon value, hiding power, hardness, dry film thickness, wet film thickness, abrasion resistance, flexibility.
9. Preparation of a white baking finish in a pebble mill; preparation of a colored lacquer.
10. Applications of the various paints made, using a brush, dip coater and spray gun.

In addition, five evenings will be given over to film shows of two hours each, dealing with the manufacture of raw materials and paints, and the application of same; these movies are loaned to the department by many industrial concerns.

The registration fee for the beginner's course is 25 dollars and the enrollment is limited to 25 students.

Advanced Refresher Course

Monday, July 6

Drying Oils Day

9:30 a.m. *Chemistry of Drying Oils*, Dr. Wouter Bosch.

1:30 p.m. *Natural and Improved Drying Oils*, Robert L. Terrill, Spencer Kellogg and Sons, Inc., Buffalo, N. Y.

8:00 p.m. *Films.* Subjects pertain to the manufacture and application of paints.

Tuesday, July 7

Hard Resins Day

9:00 *Hard Coating Resins*, Dr. Bosch

1:30 p.m. *Hard Resins Should Not Be Forgotten*, John M. Hafeli, Reichhold Chemicals, Inc., Argo, Ill.

Wednesday, July 8

9:00 a.m. *Alkyd Resins*, Dr. Bosch.

1:30 p.m. *The Paint Laboratories in Action*, students will visit the school paint laboratories.

8:00 p.m. *Alkyd Resins*, John F. Pooney, American Marietta Company, Kankakee, Ill.

Thursday, July 9

Miscellaneous Resins Day

9:00 a.m. *Miscellaneous Coating Resins*, Dr. Bosch.

1:30 p.m. *Modern Paint Supply Techniques*, Harry A. Murphy, Jr., Gray Company, Inc., Minneapolis, Minn.

3:30 p.m. *Continuation of student's visit to the paint laboratories.*

Friday, July 10

Latex Day

9:00 a.m. *Latexes*, Dr. Bosch

1::30 p.m. *Synthetic Latices: Present and Future*, Russell B. Green, Monsanto Chemical Company, Springfield, Mass.

8:00 p.m. *Plasticizers in Coatings — Why and How*, A. Dave Evans, Monsanto Chemical Company, St. Louis, Mo.

Monday, July 13

Lacquer Day

9:00 a.m. *Nitrocellulose Lacquers*, Dr. Bosch.

11:00 a.m. *Conventional and High Solids Lacquers*, Frank E. Piech, Hercules Powder Company, Wilmington, Del.

1:30 p.m. *Hotspray Lacquers, Military and Specification Lacquers, Aerosol Lacquers*, F. E. Piech.

4:00 p.m. *Airless Spray Painting* James A. Bede, president, Bede Products, Inc., Cleveland, Ohio.

8:00 p.m. *Cellulose Acetate and Ethyl Cellulose Lacquers, Parlon Paints* and *Lacquers, Spray Methods, Fundamentals of the Use of Nitrocellulose in Lacquers*, F. E. Piech.

Tuesday, July, 14

Solvents, Driers and Additives Day

9:00 a.m. *Latest Developments in Solvents for the Coatings Industry*, Leon J. Breton, Enjay Company, Inc., Alcohols and Chemicals Division, New York, N. Y.

1:30 p.m. *Paint Driers*, C. A. Klebsattel, Naftone, Inc., New York, N. Y.

4:00 p.m. *Paint Additives*, C. A. Klebsattel.

Wednesday, July 15

White Pigments Day

9:00 a.m. *The Manufacture, Properties and Uses of White Pigments*, James

James A. Bede

Dr. Wouter Bosch

Leon J. Breton

C. C. Candee

A. Dave Evans

Russell B. Green

John M. Hafeli

C. A. Klebsattel

Lecturers For The Third Advanced Paint Refresher Course

North Dakota Agricultural College Fargo, N. D. July 6th-July 17th 1953

James MacGuffie

S. R. Mountsier, Jr.

Harry A. Murphy, Jr.

Frank E. Piech

John F. Rooney

Dr. W. F. Spengeman

Harold E. Spitzer

Robert L. Terrill

acGuffie, Titanium Pigment Corporation, New York, N. Y.

1:30 p.m. *Extender Pigments are nctional Pigments*, S. R. Mountsier, ., Whittaker, Clark & Daniels, Inc., ew York, N. Y.

Thursday, July 16

9:00 a.m. *The Pigment Spectrum 1*, Dr. Willard F. Spengeman, E. I. duPont de Nemours & Company, Inc., Newark, N. Y.

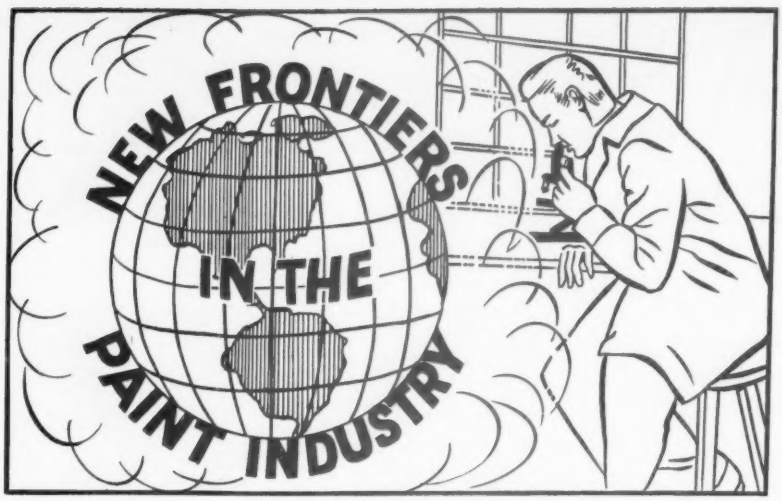
1:30 p.m. *The Pigment Spectrum 11*, Dr. W. F. Spengeman.

8:00 p.m. *Theory and Practice of Pigment Dispersion*, C. C. Candee, Kinetic Dispersion Corporation, Buffalo, N. Y.

Friday, July 17

9:00 a.m. *Realistic Paint Formulations*, Harold E. Spitzer, Sherwin-Williams Paint Company, Chicago, Ill.

1:30 p.m. *Questions and Answers.* Moderators: Dr. Bosch and Harold Spitzer.



BIOCHEMICAL ASPECTS OF PAINT RESEARCH

By
PHILIP HEIBERGER

THE paint industry cannot properly be classified into any unique category such as an organic chemical, a chemical process or a chemical specialty industry. It is all of these and many more. The paint industry benefits from the scientific contributions of the various groups of chemists, chemical engineers, physicists, ceramicists, metallurgists, mycologists, agronomists and many others, even psychologists. Of all the contributing sciences, biochemistry is probably the least recognized. For that matter, some may even doubt that biochemistry belongs in paint research.

Because biochemistry is so completely associated with the study of the life processes of living organisms, certain pertinent, although indirect, contributions to paint research are completely overlooked. Despite the tremendous amounts of synthetic resins and oils used by the industry, there are still many raw materials derived from living plants or from by-products of life processes. Well known examples are the drying oils, shellac, natural gums and the terpenes.

In order to carry on their work, biochemists developed many useful methods specifically designed to study dynamic systems in minute quantities. By these means, it is possible to study the metabolism of living cells, the effects of trace elements on plants or the component amino acids of a given protein.

Needless to say, the fact that a paint film is a dynamic, rapidly changing and relatively unstable system is well known. Chemical methods are inadequate for studying film formation and deterioration. Of all the scientists, biochemists are probably the most skilled in separating and identifying minute quantities of complex materials. Their methods can very well be adapted to film research. Some of the techniques favored by biochemists are paper chromatography and the use of radioisotopes; these two topics were previously discussed in this section.

Recognizing that most paint people know very little about biochemistry and vice versa, I have discussed this matter with *Dr. Norman S. Radin*, a research biochemist at the University of Texas. On one hand, we discussed the various phases of biochemistry which could be of direct interest to paint people; on the other hand the various aspects of paint research were considered which might be best investigated by means of the techniques preferred by biochemists.

Dr. Radin proved to be an almost inexhaustible source of information and has convinced me that biochemical research and biochemical techniques belong in certain phases of paint research. The following material merely highlights some of the range and possibilities envisaged by Dr. Radin.

Soils and Growth

Raw materials such as the natural drying oils, turpentine, rosin, fossil resins, rubber and shellac are products of life processes in plants and animals. These materials are synthesized by nature from air and soil. The price and quality of these products are dependent upon the biological steps involved in their formation.

In order to learn the effects of each variable, plants or animals must be studied under conditions where each variable can be under complete control. It is now possible to study plants under rigidly controlled conditions of temperature, humidity, light intensity, light duration or soil compositions.

For example, it has been observed that flax grown during periods of longer nights produced linseed oil having higher iodine numbers. This observation may seem trivial.

After all, the flax farmer can hardly be expected to alter the day/night ratio over his farm. However, this observation can and should be investigated from the biochemical viewpoint in order to determine the nature of the light/dark effect. Once the actual chemical reactions involved are known, the influence of the light will become known. From this knowledge, methods will most certainly become available for the *chemical simulation* of longer nights; and in consequence, the production of more highly unsaturated oils.

Agricultural scientists have studied for many years the influence of soil composition on plant growth. However, only one criterion was ever seriously considered and that was the effect on growth alone resulting from a change in fertilizer or soil composition. It is only recently that enough variables can be controlled accurately to interest the biochemist. He would approach the problem of plant growth from a more sophisticated point of view. He would be interested in relating yield of oil, iodine number of oil, the distribution of fatty acids with climactic conditions and soil content. With sufficient stimulation from oil consumers such as the paint and resin manufacturers, this type

of programming may actually be carried out.

This realization is not unrealistic because it is well known that similar experiments have greatly benefitted farmers and consumers of edible farm products. All living things, amimal or vegetable, flourish best when fed a balanced diet. Since the soil supplies the source of plant food, a good soil will provide a balanced supply of minerals. Fertilizers are added to provide this balance in cases of deficiency or to replenish losses. However, it appears that the various minerals have conflicting effects. For example, certain tung oil trees in Florida were found suffering from a copper deficiency. This deficiency was readily corrected by the addition of copper salts to the soil. However, in the presence of fertilizer with a high nitrogen content, more copper was required to remove the deficiency. In other words, the excess of one vital element can produce an apparent deficiency of another vital element, even though present in adequate amounts. Similar relationships in tung trees were found to occur between magnesium and boron, and between potassium, calcium, magnesium and manganese.

The biochemist is not satisfied to merely learn the many relatively simple interrelationships of which there are an incredible number. He desires to understand the chemistry involved in these effects. In learning the chemical reactions, the influence of each element can then be understood. Only then can the reaction (or growth) be influenced in the direction desired by the consumer, whether housewife or paint manufacturer. Scattered bits of information are already known, but these are so meagre that one may only anticipate future developments.

Minerals appear to effect living systems in two ways. In each case, they alter the action of enzymes. Enzymes are specialized proteins each capable of specifically catalyzing one or a few chemical steps. Almost all chemical reactions in all living things are catalyzed by enzymes. In some cases, a mineral element combines directly with an enzyme which is thereby either stimulated or inhibited. In other cases, the element first combines with some other complex organic compound which then combines with the enzyme. Well known examples are the combination of iron in hemin (which gives blood its red color), the combination of magnesium in chlorophyll and the combination of cobalt in vitamin B_{12}.

Biosynthesis of Drying Oils

The biosynthesis of oils in animals is already under investigation. Anyone who had to undergo a reducing diet will not be surprised to learn that oils are derived from carbohydrates. In fact, even the chemistry of this conversion is fairly well established. Many laboratories are now studying this reaction, evaluating the effects of different chemicals and conditions. It appears that carbohydrates are converted, through a long chain of enzyme reactions, into acetic acid which then combines with a vitamin derivative; the vitamin complex combines with other acetic acid containing compounds to build up the long molecules of fatty acids.

The fatty acids thus produced are saturated, (iodine value = 0) but by some remarkable means, the living organism then proceeds to extract hydrogen atoms from various positions to produce the unsaturated fats. Unfortunately for industry, the enzymes involved in the desaturation steps are still somewhat obscure. Practical application of these important steps must wait on the further efforts of biochemists.

It is known that different species of living things have different desaturating enzymes, and that this difference is a major factor in determining whether the resultant fat is saturated or not, and if unsaturated, whether the double bonds are conjugated or not. The relative amounts of these enzymes in any given species will depend on a host of variables, some of which have been mentioned. It is likely that other raw materials such as rubber, rosin and turpentine are also derived from acetic acid through a chain of enzymatic steps.

Genetic Modifications

The modifications just discussed may be accomplished by the addition of chemicals to the soil, to the growing plant, to the seeds or to the product of the plant. However, biochemists are also studying another approach to the modification — and understanding — of living things. They are now investigating methods of altering the actual *identity* of organisms; that is, they are changing the genetic character which determine the uniqueness of a species and an individual. This means that radically different, and improved, plants and animals may someday be produced almost at will.

The genetic structure of an organism may be changed by radiations such as ultraviolet or X-rays, or by atomic particles. Chemicals also have been found to affect the genetic character of many species. One group of these, the nitrogen mustards, are used to treat certain types of cancer. Another chemical, colchicine, finds extensive practical use in altering plants. For example, colchicine has been used to modify the sugar beet to produce a new variety having a higher sugar content.

An important group of components of genetic material is known as the nucleic acids. In at least one microorganism, the addition of certain nucleic acids to the bacteria results in an uptake of the genetic chemicals to apparently modify the bacteria's own normal inheritance. This field will be greatly extended in the near future; but its application will be limited to problems of interest to the biochemists, physicians, farmers and other aggressive groups. Whether any applications to problems of paint materials will be made will depend on the interest of paint groups in supporting such research.

Biochemists are keenly interested in the chemistry involving the various stages of biological growth. Just as animals elaborate a growth hormone for the use of the rest of their body, plants similarly produce hormone which control their entire metabolism. The best known are indoleacetic acid and its ethyl ester, the latter just recently discovered. These substances have a wide variety of effects, even when applied to the exterior of a plant. These findings have stimulated the search for other growth substances, synthetic as well as naturally occurring. The synthetics are extensively used in horticulture. The auxins, as these substances are called, are employed to prevent premature droppings of fruits, to prolong dormancy of buds, to aid in the development of roots of the many plants which are propagated by cuttings, in the killing of weeds and still others.

The problem of prolonging dormancy of tung tree buds is definitely of interest to users of tung oil. Late frosts appear to be common enough to damage an important fraction of the tung trees whose buds have opened too soon. Investigation of the mechanism of bud opening and the chemicals involved would be a biochemical problem of economic interest.

The influence of auxins on the production of drying oils has hardly been studied. This is another fertile field for biochemical research. It has been found in the case of turpentine that naphthylacetic acid, a synthetic auxin, will appreciably increase the turpentine yield per tree when applied to the collection cuts in the form of a lanolin paste.

Shellac is the product of tiny insects which grow on certain trees in a rather haphazard manner. Efforts to synthesize the major constituents of shellac have met with nearly insur-

mountable difficulties. It is rather likely that a biochemical study of the nutritional requirements of the lac insect might result in the formulation of a "feed" which would greatly increase the biosynthesis of this useful resin. The shellac producer has only to look at the great advances made by nutritional studies in the dairy- and meat-producing industries to realize the potential usefulness of a similar approach to even a lowly bug. The value of proper breeding of the various varieties of lac insect also should not be overlooked. The great productivity of the American farmer is due in part to careful, scientific breeding of plants and animals. The development of a lac "feed" might also make possible the cultivation of the insects in our own country and thus render us independent of political upheavals.

Fungicides and Insecticides

The development of really effective fungicidal and insecticidal paints is the goal of many laboratories. At present, much of the research in this field is highly empirical; organic chemists turn out new compounds, which are tested against various destructive insects or parasitic plants, the fungi. If successful they are given field tests. However, a more important role is gradually being developed by the biochemist. Increasing number of biochemists are starting to study the chemical processes of fungi and insects, their nutritional requirements and the peculiarities in their chemical makeup. These studies will provide radically improved ways of fighting insect and fungal depredations.

The empirical approach is a never-ending battle, for in the case of insects, they adapt themselves to resist each insecticide. The presently reduced effectiveness of DDT is well known; the newer insecticides are meeting the same change in resistance. Fundamental work on the biochemistry of insect and plant pests is necessary to learn how to overcome this adaptability.

Some of the ways in which fundamental research may produce effective fungicides and insecticides can be given in relatively non-technical language. First, it is necessary to understand that all life processes are the results of chemical steps which are carried out by enzymes. Some of these steps are not vital to life, but most are, for living organisms are systems which consist of tremendous numbers of interrelated chemical reactions. As with an automobile, destruction of just about any single part is enough to put the whole thing out of commission.

If a vital chemical conversion can be blocked by administration of a poison, the obnoxious organism can be killed. Many poisons are known which will block many vital steps; unfortunately, these also block the same vital step occurring in the organism being protected. One of the remarkable observations of biochemistry is the universality of many biochemical steps; that is, many identical or very similar chemical reactions are carried out by all forms of life, from the tiniest to the largest. There *are* differences, however, and it is in these differences that the chink in the pests' armor must be found.

A biochemical step may be blocked in several ways. One is to change the environment around the enzyme involved so that its delicately balanced structure is upset and it loses its magic catalytic ability. Another way is to apply a compound which will react chemically with the enzyme, converting it to an inactive form. This appears to be the mechanism of action of the war poison gases.

The appraoch that at present holds the most possibilities is that of "competitive inhibition". Enzymes appear to act on their particular chemical raw materials ("substrates") in a very specific manner that has often been likened to a lock and key. The substrate molecule must apparently *fit* into a cavity in the enzyme molecule before it can be changed. Often a specific metallic ion or organic compound must *also* fit inside too, as though two keys are needed simultaneously to turn the lock. Like most locks, enzymes are not completely specific, and a "skeleton key" can usually be found which will also fit into the enzyme's cavity.

Chemicals which will do this, but will nevertheless not be affected by the enzyme, are called competitive inhibitors. They are inhibitors because they take up a place in the enzyme molecule and keep out the legitimate substrate chemicals; they are competitive because they compete with the proper substrate for the vital space. If the substrate concentration can be increased, the interloper will tend to be forced out and its inhibitory effect overcome.

The classical example of competitive inhibition is provided by the spectacular success of sulfanilamide. This simple chemical appears to stop bacterial growth by pushing aside a very similar, but essential substance, para-aminobenzoic acid. The two chemicals look very similar to certain enzymes, which try to act on the drug but cannot. The practical success of the sulfa drugs is due to the ability of the *human* enzymes to distinguish between the "skeleton key" and the vital substrate better than the bacterial enzymes.

The sulfa drugs are not ideal examples of competitive inhibitors because they tend to inhibit the organism being protected. Active search is now being made to prepare inhibitors which block steps found only in the obnoxious organism. This requires, first, the determination of chemical reactions peculiar to the pest, and then synthesis of inert compounds similar to the normal substrate. Success in these goals is not enough; the inhibitor must be reasonably stable, must be capable of penetrating the organisms's skin and must be readily and cheaply applicable.

When a chemical step is blocked, the reaction preceding this step tends to continue, and the living organisms tend to accumulate the substrate of the blocked enzyme. When this happens, the inhibitory action of the foreign chemical is partially overcome, because of the competition for the site of action in the enzyme molecule. In other words, competitive inhibitors tend to be less effective than one might hope. However, if the biochemist succeeds in elucidating *two* successive biochemical steps, he may then try two inhibitors, one for each step. This promises to be much more effective since the reversal effect due to accumulation of a substrate should be greatly minimized.

Some inhibitors are more insidious in their action. Arsenic compounds, for example, appear to displace phosphorous in the latter's normal reactions. The arsenic compounds that are produced by the befuddled enzymes cannot participate in further reactions and serve simply to rapidly drain off vital chemicals. Fluoroacetic acid, a rat killer, appears to act similarly. It seems to be converted enzymatically to fluorocitric acid, which then acts as an efficient competitive inhibitor.

On the basis of the procedure just described, the development of fungicidal and insecticidal paints is a field in which the biochemist should be allowed to participate. The depredations of fungi in tropical climates became well known to American GI's during the last war, and, probably as a consequence, the obnoxious activities of fungi in temperate climates became better understood. Apparently a good deal of paint "dirtying" in the warmer parts of this country is due to fungus growth.

The mechanism of fungus growth on paints is little understood; however, something is known of the metabolism of a wide variety of molds (a term generally used interchangeably with fungi). From the little information

available, an experimental approach to the problem may be envisaged.

Fungi lack chlorophyll and are therefore unable to synthesize food from simple sources. They get their nourishment from various organic substances. Among other things, they require a source of nitrogen, water and minerals. Most paints contain suitable carbon and nitrogen sources: linseed oil, casein, oil rich alkyds, urea and nitrocellulose — to mention a few and these can be utilized as food. The pigments supply quantities of calcium, sodium, manganese, cobalt and other vital elements. The thin film of atmospheric dirt settling on all surfaces generally supply the additional necessary minerals, moisture and supplementary nitrogen requirements.

Considering all factors, the amount of mold growth appearing on paint often appears fantastically large. Actually molds consist of over 90% water and their dry weight is considerably less than appearances indicate. However, fungi are responsible for damage far out of proportion to their dry weight. The damage is probably due to the fact that fungi, as a class, process tremendous amounts of chemicals. Because of this ability to transform large amounts of material, an entire industry has been developed and many substances sold in tonnage quantities are made by fungal action. These chemicals include the antibiotics, penicillin, and a host of polyfunctional acids such as gluconic, citric, fumaric, gallic and itaconic acids. Because of the acidity of the products, an extremely small amount of mold can destroy paint as well as the surface being protected.

The preparation of mold-resistant or fungicidal paints well require a thorough biochemical study of the common molds found to attack paints. This will be followed by enzyme inhibitors. The "skeleton key" compounds must be reasonably compatible with most paint formulations, small amounts should be effective and should not injure the normal properties of paints. They should be stable to heat, light and moisture. Excessive toxicity to humans and domestic animals must be avoided.

Because there are so many different species of molds, each with its peculiar metabolic abilities, it seems unlikely that the problem of fungal protection will be met by a single, universal fungicide. A mixture of inhibitors, each particular mixture being effective against a particular group of fungi will probably be formulated.

The capabilities of molds are sometimes surprising — and deadly. From time to time cases of arsenic poisoning were reported. It was observed that the victims lived in rooms containing an obnoxious odor, characteristic of gaseous organic arsenic compounds. Subsequent study showed that certain molds were living on the wallpaper in these rooms. Aided by the unusual dampness of these walls, the molds were converting arsenic pigments in the wallpaper into a deadly methyl arsine.

Oxidation

Biochemists as well as paint chemists are interested in the reactions of chemicals with oxygen. The biochemist is interested because nearly all organisms use oxygen to oxidize their foods; the paint chemist is interested because drying oil paints "dry" by oxidation. Both groups are attacking this problem vigorously and with equally poor results: the mechanism of oxygen activation is still unsolved. However, there is good reason to believe that the mechanism of oxidation is similar in living things and unsaturated oils.

All forms of life contain auto-oxidizable substances. In order to function in an orderly manner, special chemical reactions have been developed to maintain these substances in the correct state of oxidation. Some of these mechanisms are partially known, and it may be that they can be applied to the problem of paint storage, where oxygen uptake should be minimized, and to the problem of aging of paint films, where oxygen uptake should be prevented. Living things contain anti-oxidants, such as the phenols and quinones. The food industry utilized these anti-oxidants to preserve the fat components from autoxidation. Most, if not all life forms contain highly unsaturated fats in their physiological makeup, yet these oils are stable and do not oxidize in the living organism. When the biochemist has morefully elucidated this matter, he may very well supply many profitable suggestions to the paint chemist.

Tank Farming

Another facet of biochemical research may prove startlingly valuable to the raw material manufacturer. Studies are now under way utilizing algae and similar micro-organisms as commercial sources of raw materials. The micro-organisms are to be grown in tremendous tanks using sewage or industrial wastes (antibiotic fermentation liquors, paper processing liquors and the like) or sunlight and carbon dioxide. By various methods, organisms are being developed for specialized purposes.

Some tank farms may be developed for the production of proteinaceous materials, for animals feeds, Others, given sufficient incentive, may be developed for the production of unsaturated oils, thus providing a steady and cheap source of quality drying oils. Even the production of resins and shellac-like substances by micro-organisms is reasonable; the synthetic abilities of these little creatures are remarkably effective and varied.

Obviously, the commercial feasibility of such methods will depend on the degree to which research on the problem is prosecuted. Outstanding successes are already known in the field of antibiotics and mold synthesis, where wide ranges of organisms have been examined and their nutrient requirements for synthesis of the desired product have been carefully determined.

A reasonable variation on the idea of tank-farming is the use of micro-organisms to carry out a single chemical reaction, such as the desaturation of non-drying fats to form effective drying oils. The step might be even simpler — just the conversion of a non-conjugated drying oil to the more desirable conjugated one. Several industrial processes now use bacteria or molds to carry out a simple step or series of steps, the substrate being obtained from other sources. The synthesis of vitamin C from sorbitol and the products of fermentation are outstanding examples.

Living systems have certain obvious disadvantages and it may prove possible to use isolated purified enzymes which will carry out the above reactions. The enzymes need be purified only to remove destructive enzymes associated with the desired enzyme. Today, there are companies which supply enzyme preparations for industrial use. These enzymes include protein dissolvers to clarify beer and starch dissolvers to remove size from textiles.

In using the products of nature, the price is dependent primarily on two factors, labor and transportation. The price of labor is continuing upward, even in the so-called backward countries from which many of the natural resins are obtained. Many of the natural resins and drying oils are grown in relatively inaccessible areas so that the cost of transportation is becoming more and more a factor. It is therefore vital that intensive research should be carried on in all areas of scientific achievement. This is the only way to offset rising labor and transportation costs as well as to diminish the hazards due to political uncertainties.

Considering these factors, the employment of several biochemists in this industry may very well turn out to be an excellent investment for a far sighted organization.

Recent Developments in Drier Technology

By CHARLES GARDNER*

THE excursion into the field of the Rare Earth metals was a natural and necessary offshoot of our firm's drier research, because up until early 1951 when these metals were introduced, the effective driers were well limited to the big four, Lead, Cobalt, Manganese and Zinc.

The first break in the accepted tenets of drying metals was in the introduction of 4% high viscosity calcium naphthenate as a paint drier. Heretofore, calcium soaps had never been considered a paint. But the heavy 4% Calcium Naphthenate not only acted as a drier, but also was an effective stabilizer against lead throw-out in alkyds and phenolic varnishes. Moreover it could be substituted for lead in fumeproof paints, could activate the efficiency of cobalt, and helped minimize haze in alkyds.

Another departure in drying principals was the re-introduction of iron as a drier. Iron naphthenate, because of its controlled metal content, and improved stability, soon found its place as an effective drying aid in bake finishes and air-dry formulations, especially where carbon black and iron oxides are part of the formulation.

Charles Gardner

Rare Earth Naphthenate

Our first choice as a cobalt substitute, other than calcium, was cerium 6% naphthenate. When used in a paint alone, however, cerium naphthenate showed only fair properties as a drier. In a white paint, the cerium radical changed valency and yellowed the paint.

If one examines the valency changes of metallic cerium as it oxidizes you might readily discover why cerium alone may not be too effective as an air-drying catalyst.

Now we know that the traces of the other rare earth metals combined with cerium are very close in their atomic weights to each other. Cerium has an atomic weight of 140.25, praseodymium 140.92; neodymium 144.25; and lanthanum 138.90. Assuming that because of this closeness, the properties of cerium would not be harmed, we made a solution of a Rare Earth Naphthenate consisting of 50% cerium and 50% lanthanum with the infinitesimal

This is an excerpt of the paper presented before the New York Vehicle Manufacturer's Group on May 13, 1953. This paper was also presented before the Chicago Paint and Varnish Production Club on Mar. 2, 1953.

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traces of the other metals. Immediately our production costs were cut in half, and the drying results obtained were little short of startling. In the first place, in white refrigerator enamels, baked at 350°F. for 30 minutes, where cerium alone might give discoloration, the Rare Earth combination showed no discoloration, gave excellent mar resistance, and helped increase the adhesion.

Further field tests with Rare Earth Naphthenate in epon resins, styrenated alkyds, silicones, and everyday oleo-resinous baking alkyds, confirmed the laboratory results of cleaner, tougher, and better adhering films.

Our experiments have proven that when small amounts of Rare Earth Naphthenate are added, approximately 0.03-0.08% metal based on the resin solids, improved mar resistance can be obtained. In many cases, as with the epon resins, up to 10% of the urea or melamine can be removed, and in some places, where the added amines are only 10% of the resin solids, they can be completely eliminated by using small amounts of Rare Earth Naphthenate.

The same results hold true with baking type soft oil alkyds such as soya or dehydrated castor oil alkyds. As little as half the amount of Rare Earth metal can be used to replace the normal amount of cobalt in order to obtain equal drying performance with improved toughness of film and with the absence of the usual discoloration noted at elevated temperatures.

In summation, generally, the use of Rare Earth Naphthenate 4% in baked finishes will give increased cross linking in molecular structure resulting in markedly tougher and harder films; wide range of activity at normal baking temperatures and cycles; excellent color retention in baked films; savings in cost by reducing amino resin additions; improved water and soap resistance of film; and marked drying efficiency in baked films where other metallic driers have proved inefficient.

Zirconium Drier

The use of Rare Earth Naphthenate not only served as a cobalt substitution, but actually, as noticed, produced a new type of drier that could stand on its own merits. But it did not solve the problem of a cobalt substitute for air-drying finishes.

For many reasons, zirconium seemed a logical choice for investigation. The prime cause for consideration was the fact that zirconium has a strong affinity for oxygen and can readily form chelating rings with molecules having oxygen atoms attached to adjacent or nearby carbon atoms. Zirconium also has a maximum covalency of 8 and can easily bind additional molecules or ions. The zirconium soaps were known to react with the amino acids, and with fatty acid ions such as stearates, palmitates, and oleates, which produced surface films that are highly water repellent.

Yet, as late as 1946, zirconium was not considered as a drying metal. It had been classified as a rare metal although it was as abundant and as prevalent as carbon, but its drying properties alone were considered nil. Various acid carriers from tall oils to naphthenates, to linoleates were tried to activate zirconium so that it could act as a drier. None were successful. Only when a complex metal carrier was synthesized by us could zirconium be used, not as a drier in itself, but as a catalyst and partial substitute for the other conventional metals employed.

Generally, Zirco Drier Catalyst 6% may be used to replace 40% of the cobalt or 50% of manganese with resultant equal drying speed, better hardness, superior gloss, and improved adhesion.

Like Calcium or Zinc, Zirco Drier Catalyst 6% does not discolor in the presence of hydrogen sulfide fumes. This characteristic makes the product of interest in the preparation of fumeproof whites where the zirconium metal complex will deliver the performance expected normally of lead metal as a drier.

Also this drier, being a practically colorless liquid, naturally lessens dry film discoloration because reduced dosages are required of other metals such as manganese and cobalt.

Further work in the field has proven that Zirco Drier Catalyst is of invaluable aid in force dry finishes. One linoleum manufacturer reduced his drying schedule in one particular case from 60 to 40 hours and still obtained the necessary hardness for his product. The usual procedure at this plant is to apply a coating of paint to an asphalt-saturated felt, then cured at 120°F. for 2 hours to prevent bleeding. The addition of Zirco gave less tack and better hardness after the two hours. Then a print paint is placed on top of this coating, and it was here that normal cure of 60 hours was reduced to 40 hours.

Hexogen Driers

Hexogen or octoate driers are essentially petroleum solvent solutions of metallic salts of 2-ethyl hexoic acid, a purely synthetic product. The driers, based on this synthetic acid, have certain inherent advantages which are:

(1) They are odorless because the acid is odorless and odorless solvents are used. The active driers have less odor than any of the drying oils, varnishes, or alkyds with which they may be used.

(2) Improved drying under humid conditions: There are many indications to justify consideration of Hexogen driers for service under conditions of high humidity during drying of paint films.

(3) Silicones: Air-drying type silicone resins can be cured faster by the addition of the various metallic Hexogen driers. The driers are presumed to enter directly into the silicone structure by promoting cross linkage between the adjacent molecules. Therefore the use of driers must be carefully watched or gelation may result.

Other Types of Driers

Among those metals that were tested and did not prove efficient as driers, Copper Naphthenate became a factor as a fungicide and anti-mildew agent. It was

(*Turn to page 76*)

Albert E. Forster

Albert E. Forster Elected President of Hercules Powder

Albert E. Forster has been elected president, and chairman of the executive committee of the Hercules Powder Company, Wilmington, Del., succeeding Charles A. Higgins in both positions. Mr. Higgins who was named president in 1939, will continue as chairman of the board.

Hercules' new president has served as vice president and a member of the executive committee since 1951; and as a director since 1940.

Mr. Forster joined Hercules in 1925 as a technical service man in the firm's San Francisco office. He left the firm in 1930, rejoining in 1934 as a member of the Explosives Department. After a succession of promotions he was named general manager of the Naval Stores Department in 1940.

The retiring president, Mr. Higgens, was born in England. He became associated with Hercules in 1915, and during his reign was responsible for the firm's expanded activity in the cellulose chemicals and naval stores chemicals fields.

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Morris Paint Holds Open House At East St. Louis, Ill. Plant

More than 600 people attended an Open House at the Morris paint factory in East St. Louis, Ill., April 15-17.

The occasion was the completion of a new addition to the Morris plant.

Visitors, including dealers, raw material people and their families, were given a complete tour of the buildings.

Foreman's Role in Plant Safety Theme of 2 Safety Council Films

The foreman's key position in a plant safety program is the theme of two safety films released by the National Safety Council.

Pick Your Safety Target, an all-color cartoon film based on actual accident-reduction plans within industry, features a foreman beset with an accident-ridden department. The film sets forth a three-step plan for detecting accident causes and taking corrective action.

The three steps, based on departmental accident reports, call for determination of (1) the material or equipment involved in the accident, (2) the action taken by the worker that resulted in the accident, and (3) the details of the accident.

The film shows the foreman the accident pattern in his plant, and how his accidents can be substantially reduced by aiming at one target at a time.

The second film, *A Gray Day for O'Grady*, employs a series of comedy situations to dramatize the high cost of accidents.

The moral of the story is that the time and money used to prevent accidents is a lot less than the time and money it costs to have accidents.

The Sarra-produced films were prepared under the supervision of Charles Alexander, manager of the industrial department of the National Safety Council, and Glenn Griffin, the Council's director of industrial training.

A Gray Day for O'Grady is available in 35mm sound slidefilm (b & w) and 16mm sound motion picture (b & w). *Pick Your Safety Target*, filmed in stop-motion cartoons, is available in 35mm sound slide (color) and 16mm sound motion picture (color and b & w).

For additional information, write the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.

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Haeuser Shellac Appoints Agent For Detroit and Pittsburgh Areas

The Haeuser Shellac Company of Brooklyn, New York, has announced the appointment of the Hukill Chemical Corporation, Cleveland, Ohio, as their representatitive for the sale of gum, and bleached and liquid shellac in the additional territory of Detroit, Mich., and Pittsburgh, Pa.

Huskill has been representing Haeuser in the Cleveland area for many years

Prizes Awarded at Emery Chemical Sales Conference

Prizes were awarded to winners of Emery Industries' "idea" contest for sales promotion and advertising at the firm's recent sales meeting.

The winner was D. R. Eagleson of the company's Chicago office. Second, third and fourth prize winners were in order: F. L. Ekstrand of the Philadelphia area; L. J. Hodobas, Los Angeles; and H. D. Armitage, New York district manager. There were 16 prizes in all. The judging was performed by Ruthrauff & Ryan, Inc., Emery's advertising agency.

Emery salesmen attended several technical sessions at the week-long meeting, concluded by a visit through the firm's ozone-oxidation plant for producing dibasic azelaic acid and monobasic pelargonic acid. This plant is now nearing completion.

Emery salesmen at the firm's 1953 Sales Meeting. Left to right (seated): R. D. Aylesworth, R. F. Brown, J. P. Clancy, W. A. Colby, L. J. Hadobas, A. R. McDermott, R. J. Roberts, H. D. Armitage, K. K. Boyd. Second row: J. M. Washburn, A. Moore, N. A. Ruston, E. L. Spencer, J. A. Funk, L. E. Francis, W. H. Shields, T. L. Reiling, F. L. Ekstrand, J. R. York, A. C. Fusaro. Third row: J. W. Ritz, E. V. Sack, J. P. Kramer, C. T. Burgess, N. F. Reinert, W. T. Meinert, D. R. Eagleson, W. J. Siemens, V. W. Colby.

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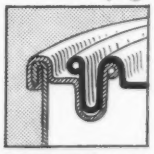

"TRIPLETITE" lid binds metal to metal at 3 points — provides 50% better protection!

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1953 Glycerine Research Awards Scheduled, Industry Announces

The Glycerine Producers' Association has announced it will continue for 1953, its Awards for outstanding research in glycerine and glycerine derivatives.

An Honor plaque and cash stipend of $1,000, and two honor certificates with cash stipends of $300 and $200 respectively, make up the Research Awards, established last year by the Association.

The work eligible for nomination may deal with applications of glycerine of value to the industry, or it may deal with discoveries or procedures likely to stimulate future application.

Any individual in the United States and Canada engaged in research in industry or in affiliation with a governmental or educational institution is eligible for the Awards. The Association has also stated that both faculty and students are eligible, and that joint entries by members or associates of research teams will be allowed.

Presentation of the awards will be made at the GPA's annual meeting in January, 1954. The closing date for nominations to the awards will be in November of this year, the exact date to be announced.

Selection of the winners will be made by a committee of three judges.

•

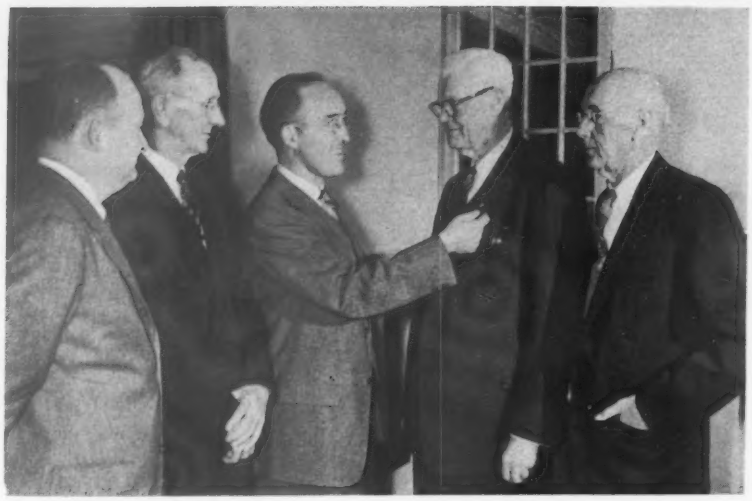
A. Scharwachter Re-Elected President of Tall Oil Assoc.

A. Scharwachter of the Arizona Chemical Company, New York 20, N. Y., was re-elected president of the Tall Oil Association at its Annual Meeting in the Hotel Hershey, Hershey, Pa., April 16-19.

Artcher E. Griffin, sales manager of the Chemical Division, Camp Manufacturing Co., Inc., Franklin, Va., was elected vice president. Dernell Every continues as secretary-treasurer and T. K. Heston as assistant secretary-treasurer.

Among the other items of business at the meeting was the admission to membership of the Crossett Chemical Company, Crossett, Ark. The Association now has 14 member firms.

T. K. Heston reported that the 11 Tall Oil in Industry bulletins, published by the TOA in individual form, have been consolidated and reprinted into a single booklet which will be available for distribution shortly.



O'Brien Corp. Honors Three Employees for 50-Years' Service

The O'Brien Corporation of South Bend, Ind., honored three 50-year employees recently with a testimonial dinner at the South Bend Country Club, attended by fellow friends.

Each of the men, Floyd M. Reece, Oren A. Fulkerson, and John J. Mulvehill, completed their half-century mark with O'Brien this year.

Jerome J. Crowley, Jr., president of the O'Brien Company, representing Gen. Joseph Battley, president of the National Paint, Varnish and Lacquer Association, presented each with a membership pin in the Fifty Year Club of the paint, varnish and lacquer industry. The men also received television sets.

Mr. Reece started as a laborer in the South Bend plant and worked his way up to the presidency, in 1944. He resigned the position in 1947 to devote his full time to research.

Mr. Fulkerson, secretary of the O'Brien company since 1930, began his career with the firm as an office clerk.

Mr. Mulvehill's 50 years' with O'Brien have been devoted to selling paints in the northwest. He is still active in the Minneapolis area.

Several Manuscripts Submitted To R. S. Aries Book Contest

A number of manuscripts on such subjects as "The Progress of the Canadian Chemical Industry" and "The Development of the American Petro-Chemical Industry" have already been submitted for the first annual book award established by R. S. Aries & Associates.

The awards, to be presented in September 1953 for the first and second best books in the field of economics of the chemical process industries, has been established to encourage chemists, chemical engineers economists and chemical executives, to be put their knowledge into print. A gold statuette plus $1,500 will be paid the winner of the first award, and a silver statuette plus $500 to the winner of the second award.

The winning manuscripts will be published by Chemonomics, Inc., an affiliate of R. S. Aries & Associates.

In order to be eligible, a book must have a minimum length of 20,000 words and must be written especially for the contest. Each manuscript must be accompanied by an entry form which may be obtained from Chemonomics, 400 Madison Ave., New York 17, N. Y.

Manuscripts should be addressed to the publisher and authors should retain carbon copies.

Entries for the awards may be submitted through July 1, 1953. Aries has announced that the judges will be headed by Prof. David D. B. Hertz of Columbia University, and Prof. John Happel of New York University, If, in the opinion of the judges, no manuscripts are found suitable, awards will be withheld.

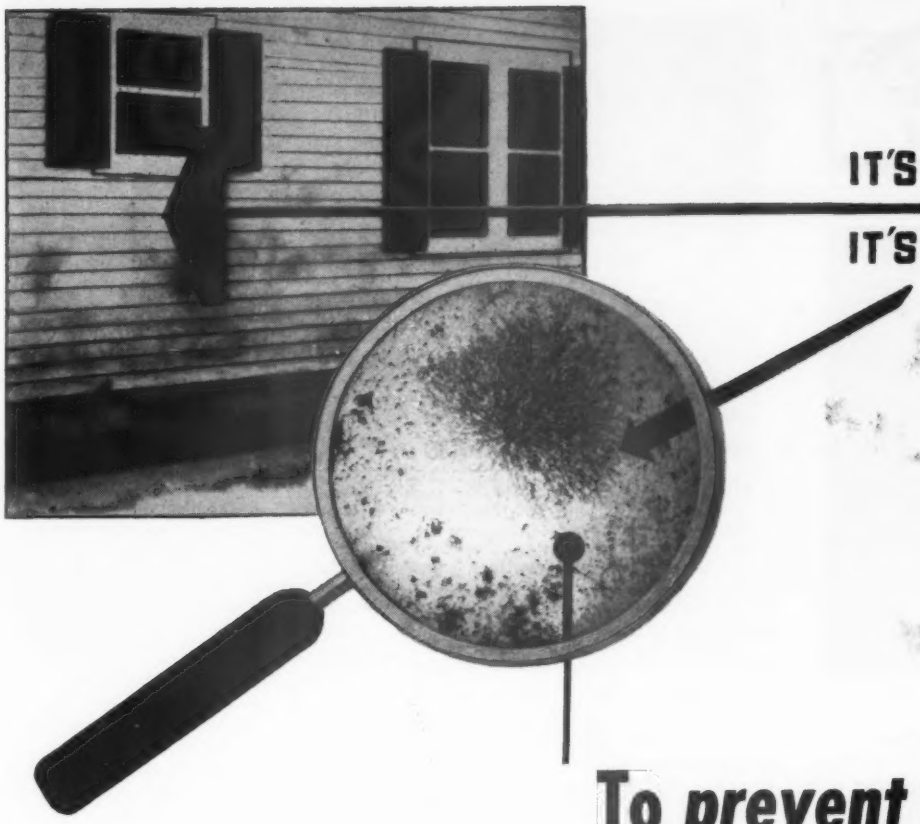
•

Celanese Corp. Purchases Marco Chemicals, Inc. of Linden, N. J.

The Celanese Corporation of America has purchased Marco Chemicals, Inc. of Linden, N. J., a firm specializing in the development of polyester resins.

According to Harold Blancke, president of Celanese, his firm will manufacture an expanding line of Marco brand products at the Linden plant as part of the Plastics Division of Celanese.

Dr. Irving E. Muskat, president of Marco, will join Celanese.



To *prevent* mildew, fortify paint with Du Pont IN-2555

FUNGICIDE

Du Pont IN-2555 (Phenyl Mercury Oleate) is an organic mercurial unsurpassed for fortifying paint against mildew occurrence. It is water-insoluble, nonvolatile at ordinary temperatures and stable to ultraviolet radiation. Additionally, it produces an amorphous film that will not creep or bloom on the surface. IN-2555 is effective in low concentrations and can usually be added to production mixes without formulation changes.

Many paint manufacturers are already profiting with Du Pont IN-2555. Its unique characteristics and wide adaptability can help you to improve your products, too. For detailed technical data, fill out and return the coupon today.

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Chlorosulfonic Acid	Potassium Silicate
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Sodium Silicate	Nitric Acid
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E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department, Wilmington, Delaware

Please send me technical bulletin with detailed information on Du Pont IN-2555 Fungicide.

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NEWS DIGEST

A. E. Horn

A. E. Horn, President of A. C. Horn Company, Retires

A. E. Horn, president of the A. C. Horn Company, and vice president of Horn's parent firm, the Sun Chemical Corporation, retired March 31.

In a round of dinner parties given by industry members and business associates, Mr. Horn was honored for his contributions to the paint field.

Among the numerous organizations he has been associated with are the National Paint, Varnish and Lacquer Association, New York division of PVLA, Metropolitan Paint Manufacturers' Association, Chemists Club, American Chemical Society and the American Concrete Institute.

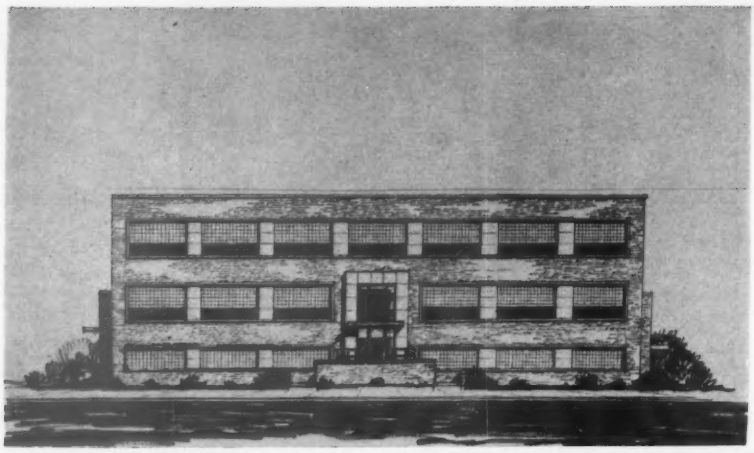
A man of varied interests and talents, Mr. Horn has been a reporter and a teacher of science in addition to a paint executive. He has published articles on kites, their origin and history, and received recognition from the French for his contributions to the waterproofing of the Maginot line.

Mr. Horn holds a B. S. degree in chemistry from the College of the City of New York and a Master's degree in physics from New York University.

•

Falk Products' New York Staff Moves to New Quarters in N. J.

The Falk Products Vegetable Oil Division of Cargill, Inc., has announced their New York staff has moved to new and larger headquarters at 615 River Road, Edgewater, N. J.



Construction on its new $450,000 research laboratory in Louisville, Ky., has been started by Jones-Dabney, Division of Devoe & Raynolds Company, Inc. The three story building will contain 21,450 square feet of floor space and will be devoted entirely to research in the resins, chemicals and finishes field. Constructed of brick and concrete, the new laboratory is located at 1481 S. 11th St., Louisville, adjacent to the existing Jones-Dabney laboratory, which will be converted to administrative and factory offices. The unit will be ready for occupancy late in 1953.

Dr. Herman Mark Awarded Honor Scroll of N. Y. Chemist Group

Dr. Herman Mark, head of the Division of Polymer Chemistry, Polytechnic Institute of Brooklyn, received the 1953 Honor Scroll of the New York Chapter of the American Institute of Chemists, at the Chapter's Annual Meeting May 21, in the Hotel Commodore, New York, N. Y.

The citation reads: "As scholar and humanitarian, teacher and expositor, scientist and researcher, you have given lavishly to young and old throughout the world. Beloved by students and colleagues, your adopted country proudly acclaims you for the distinction you have brought."

Dr. Emil Ott, director of research, Hercules Powder Company, Wilmington, Del., was principal speaker at the meeting.

•

Shell Chemical Opens Storage Facilities at Industry, Pa.

Shell Chemical Corporation has announced the opening of a new storage and shipping terminal at Industry, Pa.

Storage facilities for more than 2½ million gallons of acetone, alcohols, ketones and other chemical products are available in the 15-acre terminal.

Deliveries by tank truck, tank car and drum, will be made over an expected 150-mile radius.

The Crown Can Company, Philadelphia, featured nearly 600 products packaged in Crown's pressure-propelled "Spra-Tainer" at the recent American Management Association National Packaging Exhibition in Chicago. A demonstration of pressurized touch-up paints was presented from the "Spra-Tainer" booth which appears at the left of the above photograph.

Nat'l. Assoc. of Corrosion Engs. Makes Changes in Tech. Committees

The National Association of Corrosion Engineers has announced several personnel changes on its technical committees. They include the following:

H. W. Schmidt, Dow Chemical Company, Midland, Mich., has been named chairman of the overall Technical Practices Committee. He was chairman of the Technical Program Committee for the NACE's Chicago conference in March.

R. C. Buchan, Humble Oil & Refining Company, Houston, has been named chairman, and E. C. Greco, United Gas Corporation, Shreveport, La., vice president of TP-1 on Corrosion of Oil and Gas Well Equipment.

L. P. Sudrabin, of Electro Rust-Proofing Corp., Belleville, N. J., has been named chairman of TP-4 on Minimum Current Requirements for Cathodic Protection.

A. J. Liebman, of the Dravo Corp., Pittsburgh, assumes the post of vice-chairman of TP-6 on Protective Coatings.

Paul J. Gegner, of Columbia-Southern Chemical Company, Barberton, Ohio, is the new chairman of TP-5 on Corrosion Problems Involved in Processing and Handling Chemicals.

H. O. Teeple, the International Nickel Company, Inc., New York City, is the chairman of a newly organized sub-committee TP-5D on Corrosion by Organic Acids and Bases.

Talk on Iron Oxides Presented Before Du Pont Training Group

A talk on Natural and Synthetic Iron Oxides — Production and Uses was presented recently before members of the Technical Training Group of the E. I. du Pont de Nemours & Company Chicago paint plant.

The speaker, I. C. Clare, assistant director of research, C. K. Williams & Co., said Kroma reds were one of the newest developments in the paint field.

What had been accomplished, he said, was the production of a mass color of pure iron oxides which was materially bright, had sharp gloss and which was easily dispersed.

PERMIT RULING

The Board of Hazardous Trades of the New York City Fire Department has ruled that no permit is required for the transportation of varnish, lacquer, paint and similar coating materials in the City of New York in tank trucks or other vehicles.

NPA Removes Restrictions on Use of Cobalt for Paint Driers

Cobalt may now be used in paint driers employed in exterior house paints.

On May 1, the National Production Authority announced it had amended that part of Section 5 (h) of Schedule 2, Order M-80, which forbid the use of cobalt in paint driers used in exterior house paints.

According to the National Paint, Varnish and Lacquer Association, cobalt remains subject to complete allocation to the manufacturers of driers, but there are no restrictions upon the use of the cobalt driers which NPVLA members receive from their suppliers.

Interchemical Corp. Establishes $1,000 Scholarships at Six Colleges

The Interchemical Corporation of New York has established scholarships at six liberal arts and technical colleges for students majoring in chemistry, chemical engineering, physics and related sciences.

When in full operation, scholarship funds of $1,000 will be provided at the colleges for awards to science students in their junior and senior years.

The program will begin during the 1953-54 academic year with funds of $500 for awards to juniors.

Colleges where scholarships will be awarded are: Case Institute of Technology, Clemson Agricultural College, Illinois Institute of Technology, Lowell Textile Institute, Polytechnic Institute of Brooklyn and Rutgers University.

•

American Soybean Assoc. To Hold Meeting Aug. 20-21, in St. Louis

The 33rd Annual Convention of the American Soybean Association will be held August 20-21, at the Jefferson Hotel in St. Louis, Mo.

There will be four half-day sessions, each on a general topic such as marketing, growing, new products, and at least one panel discussion.

•

Central Soya Company Appoints Sales Agent for Chicago Area

The Central Soya Company, Inc., Fort Wayne, Ind., has named the Carl A. Lechner Company of Chicago, as their sales agent for the Chicago area.

Mr. Lechner will handle Central Soya's "Control Lecithin" for the protective coatings field.

New concepts in driers, specialty agents and fungicides were discussed at a clinic held by the Advance Solvents and Chemical Corporation in Boston, April 9. Members of the firm's technical staff presented the talks before more than 60 technical and non-technical paint people from the New England area. Also discussed at the meeting was Advance Solvents' new line of hard resins, developed under the supervision of Dr. W. Husen.

Celanese . . .

Basic source for

NORMAL BUTYL ACETATE

synthetic

Celanese synthetic production of normal butyl acetate will be the go-ahead signal for lacquer manufacturers to reformulate with this traditional medium boiling solvent.

A petrochemical producer, Celanese operates from a basic supply position—drawing on Celanese synthetically-produced Normal Butanol and Acetic Acid to produce Celanese Normal Butyl Acetate. With an internal source of basic materials and expanding plant facilities, Celanese provides the continuous volume, uniform high quality and stable price structure that manufacturers can depend upon for accurate scheduling and future planning.

Celanese Normal Butyl Acetate is now available in tank cars and drums. You can order other Celanese Solvents with Normal Butyl Acetate in compartmented cars or mixed drum carloads. Tankwagon deliveries in key areas. For complete information, write:
Celanese Corporation of America
Chemical Division, Dept. 558-F
180 Madison Ave., New York 16.

Celanese* CHEMICALS

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Bakelite Holds Technical-Sales Conference at Mellon Institute

The annual Technical-Sales Conference of the Surface Coatings Division of Bakelite Company, a Division of Union Carbide and Carbon Corporation was held April 14-17, 1953, at Mellon Institute, Pittsburgh, where Bakelite maintains a fellowship. Among the subjects discussed were recent developments in the field of coatings based on vinyl chloride, vinyl acetate and copolymers, vinyl butyral, polyethylene, polystyrene emulsions, phenoic and epoxy resins.

Those attending the conference included L. K. Merrill, Vice-President in Charge of Product and Process Development; H. K. Intemann, Assistant General Sales Manager; Howard Smith, Manager of Industrial Products Division; C. W. Patton, Manager of Surface Coatings Division, and Dr. R. W. Quarles, Senior Fellow, Bakelite Company Fellowship, Mellon Institute.

Bakelite technical representatives from throughout the country, as well as personnel from Bakelite production departments at Bound Brook, N. J., Texas City, Tex., and South Charleston, W. Va.; from the research and development laboratories at Bloomfield, N. J., Mellon Institute, Pittsburgh, Pa., and South Charleston, W. Va., and from the Development Department in New York, N. Y., also attended.

•

Springfield Paint Co. Becomes Affiliate of Kyanize Paints, Inc.

The Springfield Paint Manufacturing Corporation, Springfield, Ill., has become an affiliate of Kyanize Paints, Inc., Everett, Mass., and will operate in the future as the Seck-Devault Paint Company.

Renshaw Smith, Jr., Kyanize executive vice president and general manager, announced that the Springfield firm will continue to manufacture, sell and distribute the Seck-DeVault line on an expanding basis just as it has been doing in the past.

Under the new setup, Mr. Smith becomes chairman, and Henry D. Bainbridge vice president at Seck-DeVault. J. A. Seck, president at Springfield, and the other company officers will keep their present positions.

Vinyltoluene production plant at Dow Chemical Co., Midland, Mich.

Vinyltoluene Plant Scheduled For Production Early in 1954

A plant for the manufacture of vinyltoluene, a new raw material expected to broaden the horizon of the styrene family of compounds, will be completed by the end of 1953, and in volume production in early 1954 at the Dow Chemical Company, Midland, Mich.

The new material, the latest in a series of monomers developed in Dow's research laboratories, will supplement styrene, the well known basic raw material for synthetic rubber.

According to Dow researchers, vinyltoluene behaves chemically in a very similar fashion to styrene and can be used to replace styrene for making new families of such products as synthetic rubber, paint vehicles, rubber reinforcing resins, polyester resins and molding powders. They added that development work carried out shows that paint vehicles made from vinyltoluene will be particularly valuable.

Styrene has been used increasingly in recent years for fast drying, durable paint vehicles that are known technically as styrenated oils and styrenated alkyds. The growth in the use of styrene for this purpose has taken place despite the fact, Dow chemists say, that styrene will react to form usable paint vehicles with only a limited number of drying oils.

Vinyltoluene, they stress, will react favorably with all of the commercially important drying oils.

Quantities of the new material sufficient for developmental work are now available from pilot plant production.

Publish 1952 Supplement to 1950 Paint, Varnish Statistical Book

The 1952 supplement to the 1950 Paint, Varnish and Lacquer Statistical Handbook has just been released.

Published by the National Paint, Varnish, and Lacquer Association, 1500 Rhode Island Ave., N. W., Washington 5, D. C., the supplement covers raw materials, paints and paint products.

The supplement also contains information on 1949-1951 paint and paint product exports, wholesale price index for paints and raw materials between 1950-1951, employment and production workers in the paints, pigment and fillers industry for 1950-1951, and the monthly turnover rates (per 100 employees) in the paint and paint product industry.

In addition the publication contains sections on strikes in the paint, varnish and colors industry, population of the United States by regions, per capita income payments, 1948-1951, total income payments, 1949-1951, and industrial and housing construction.

•

Colton Chemical Company Names Southern, West Coast Distributors

The Colton Chemical Company, Cleveland 14, Ohio, manufacturers of Polyvinyl Acetate products and Polyvinyl, has announced the appointment of new distributors for their products.

They are: Moreland Chemical Co., Spartanburg, South Carolina, in the Southern textile area; Van Waters & Rogers, Dallas, Texas, in Texas and Oklahoma; Braun-Knecht-Heimann Company, San Francisco, California, in the Pacific West Coast States.

Colton Chemical also has announced the appointment of the following sales agents: Leo P. Goff, Edward R. Dornoff Company, Harwick Standard Chemical Company, and Polymer Southern, Inc.

The FORMULATOR'S DIGEST

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It's worth making right!**

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WHITE BAKING ENAMELS

Be sure of—

Good Initial Color

Excellent Color Retention on overbakes

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If your problem calls for a special solvent cut, or a specific viscosity — let us recommend to your requirements.

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NEWS DIGEST

Society for Testing Materials To Meet June 29-July 3 in N. J.

Petroleum chemistry and the effects of minute quantities of elements in various metals and alloys will be among the subjects discussed at the 50th Annual Meeting of the American Society for Testing Materials scheduled June 29 through July 3, in Atlantic City, N. J.

Dr. Frederick D. Rossini, Silliman Professor, Head of the Department of Chemistry, and Director of the American Petroleum Institute Research Laboratory at the Carnegie Institute of Technology, will discuss research products and new developments, particularly data on hydrocarbons and related compounds, in his talk *An Excursion in Petroleum Chemistry*, presented as part of the 27th Edgar Marburg Lecture.

The talk on metals, titled *Micrometallurgy*, will be presented as the Second H. W. Gillet Lecture by Jerome Strauss, vice president, Vanadium Corporation of America, New York.

•

Chemical Institute of Canada To Hold Annual Conference June 4-6

Latest methods to lengthen the life of underground oil and gas pipelines, the latest trends in automobile finishes, and the production of oil seed crops in Canada for the paint industry will be among the subjects discussed by paint chemists at the 36th Annual Conference of the Chemical Institute of Canada, Windsor, June 4-6.

The paint chemists' program will form part of the three-day Windsor Conference covering all fields of industrial and research chemistry. About 1,000 delegates are expected to attend the sessions.

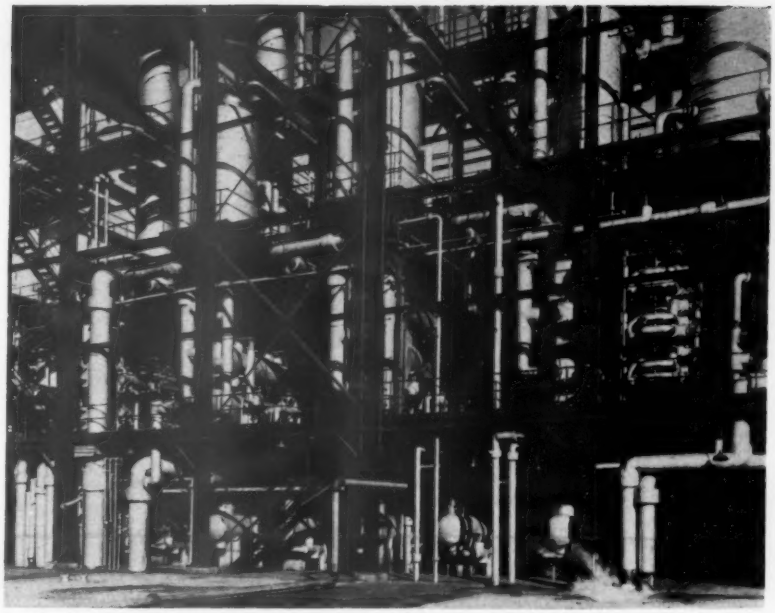
Dr. C. Y. Hopkins of Ottawa, chairman of the Institute's Protective Coatings Division, has announced that the paint chemists will hear six technical and scientific papers at their sessions on Friday, June 5.

•

C. J. Osborn Company Appoints Chicago Sales Representative

The C. J. Osborn Company of New York, has announced the appointment of the Joseph Zak Company of Chicago, as their sales agents in the Chicago area.

The Zak company will handle Osborn's line of pigments, resins and pigment dispersions.



Giant gas fractionating columns towering almost five stories in the air are used in the manufacture of Bakelite polyethylene plastic at S. Charleston, W. Va.

Bakelite Announces Plans for Polyethylene Expansion Program

Plans for the largest single expansion program in the history of the plastics industry was announced recently by the Bakelite Company, a division of Union Carbide and Carbon Corporation.

The three-year project calls for the construction of three large new plants, each with facilities to produce 60 million pounds or more of polyethylene, one of the most versatile plastics known.

When the program is completed in 1955, it will increase Bakelite's polyethylene output to more than 250 million pounds and boost total United States production to 500 million pounds. Bakelite's expected 250 million pound output in 1955, is twice the amount of polyethylene produced in the United States last year, and 25 times greater than the 10 million pounds manufactured by the firm in 1945.

The plants, each located near major gas supplies as a source for their chemical raw materials, will begin operation separately. The first, at Texas City, Tex., will open about August of this year; by mid-1954, the Seadrift, Tex., plant will be in operation, and by early 1955, the Torrance, Calif., plant in Los Angeles is expected to begin production.

According to H. S. Bunn, Bakelite president, who announced the firm's expansion plans, polyethylene's versatility is based on a combination of unique properties including excellent electrical characteristics; light weight; resistance to moisture, air, salt water and most active chemicals such as acids and alkalies; flexibility and strength that are maintained at temperatures below freezing.

He added that polyethylene, a tough waxy thermoplastic made by the additional polymerization of ethylene, when formulated to film less than two thousandths of an inch thick, is ideal for packaging fresh vegetables.

In addition to the packaging field, Mr. Vunn listed many other important applications of polyethylene including wire and cable insulation; non-breakable and squeezable bottles, pipes for water supply, radiant heat, chemicals and other countless other industrial uses.

"Bakelite polyethylene is not only the fastest growing plastic," according to Mr. Bunn, "but it has also had the greatest percentage of price reduction of any major plastic within the last ten years." Base resins of the type sold in largest volume were recently priced at 44 cents a pound, a 56 per cent reduction from the one dollar per pound rate in 1953.

Under Secretary of the Army, Earl D. Johnson, revealed recently that the Army has saved 153 million dollars in current defense procurement of wire and cable largely due to the use of polyethylene.

Mr. Bunn pointed out that the present demand for polyethylene is still far in excess of supply, the military services absorbing a considerable part of the supply. He said once the supply became adequate, polyethylene's versatility in both consumer and industrial products would be more better utilized.

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(rutile-calcium pigment; 50% TiO_2)

Finding the proper combination of white pigment and extender to produce the flat wall paint properties you want can be a tiresome task or it can be as easy as saying "TITANOX-C-50." In many cases, the proper combination of TITANOX-C-50 and extender will yield the sheen, hiding, washability and color uniformity you want.

TITANOX-C-50 provides desirable hiding at low cost for all paints in which higher titanium dioxide content than that of TITANOX-RCHT (30% TiO_2) is indicated. Like TITANOX-RCHT, TITANOX-C-50 is superior to ordinary mixtures of titanium dioxide and extenders in hiding power per dollar of pigment.

Consult our Technical Service Department for assistance with your paint formulation problems. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

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1713

C. W. Slocum

C. W. Slocum Elected President of N.Y. Paint and Varnish Assoc.

Clarence W. Slocum was elected president of the New York Paint, Varnish and Lacquer Association at the group's 66th Annual Meeting held May 14, at the Hotel Biltmore, New York.

Mr. Slocum is president of the Beckwith-Chandler Company and Vice President of Jones-Dabney, both subsidiaries of Devoe & Raynolds Company, Inc., of which he is also a vice president, and director.

Other officers elected are: Douglas C. Arnold, vice president; Frank E. Bolway, Jr., secretary; Louis Gillespie, treasurer; and Richard L. Hillman, Leo Silverstein and Fred A. Walters, named Executive Committee members for a two year terms.

Hercules Powder Opens Sales Offices in St. Louis and Houston

The Hercules Powder Company's Synthetic Department has opened a St. Louis sales office, and a sales suboffice in Houston, Texas.

John S. Autenrieth will manage the St. Louis territory which includes Missouri, Kansas, Arkansas, Texas, Oklahoma, Louisiana, Mississippi, and parts of Illinois and Tennessee. Prior to his new post, Mr. Autenrieth was a technical service representative.

Henry D. Heiser has been appointed technical sales representative for the Houston office. He has a background of 25 years' experience in the chemical industry. Most recently Mr. Heiser was manager of Hercules' Synthetics Department's district office in Wilmington, Del.

Dr. H. Selvidge, director of special products development for Bendix Aviation Corporation, demonstrates the use of new ultrasonic viscosity measuring instrument, the Ultra-Viscoson.

Bendix To Produce Quality Control Process Instrument

An ultrasonic instrument to aid precision quality control in a broad area of industry by streamlining processes involving fluid raw materials has been acquired by the Bendix Aviation Corporation.

According to Lawrence A. Hyland, vice president in charge of engineering at Bendix, the precision the instrument brings to quality control can improve the end quality of hundreds of consumer goods, including paints and paint products.

Containing no moving parts, the "Ultra-Viscoson" consists of a small sensing element, or probe, that is immersed in the liquid under test, and an electric computer. The probe is designed for permanent installation in a pipeline, kettle or fractionating tower and, with the computor connected to a recorder, produces a continous curve of viscosity.

The Ultra-Viscoson, which was demonstrated to the press in New York recently, has been manufactured on a small scale by two Hartford, Conn., scientists, Stanley R. Rich and Dr. Wilfred Roth, who developed the instrument.

Production on the ultrasonic probe, said to be able to operate in high-pressure or vacuum containers, and in a heat range from minus 200 degrees to plus 650, will begin immediately at the Cincinnati Division of the Bendix company, Mr. Hyland said.

Fourteen Complete Paint Course At Brooklyn, N. Y. High School

A course on Elementary Paint Production Techniques under the guidance of David Krancer, instructor at the Brooklyn Technical High School, was completed by 14 industry members in the New York area.

They are: Ivan Bacchus, Arnesto Paint Company; Felix P. Carrol, Interchemical Research Laboratory; Vincent Florentine, Sapolin Paints, Inc.; Salvatore Graziadei, Advance Solvents & Chemical Company; William Hauser, American Cyanamid Company; Warren A. Ingram, National Lead Company; Alexander Klayman, Bunge Corporation; John McAuley, Ross & Rowe, Inc.; William J. Muller, Devoe & Raynolds, Inc.; Frank Pierce, Eagle Paint & Varnish Company; Alfred A. Schwarz, Benjamin Moore & Company; Leo Sperber, Smith Chemical & Color Company; Daniel Tobia, Devoe & Raynolds; Aaron Rosenzweig.

Messrs. Graziadei and Hauser were complimented for attending every one of the 25 sessions in the fall and spring semesters.

The graduates recived Association certificates from E. Harold Shakespeare, chairman of the Technical Training Committee of the New York Paint, Varnish and Lacquer Association.

Registration for the next class will be held on September 14-15 at the Brooklyn Technical High School, 29 Fort Greene Place, Brooklyn, N. Y.

•

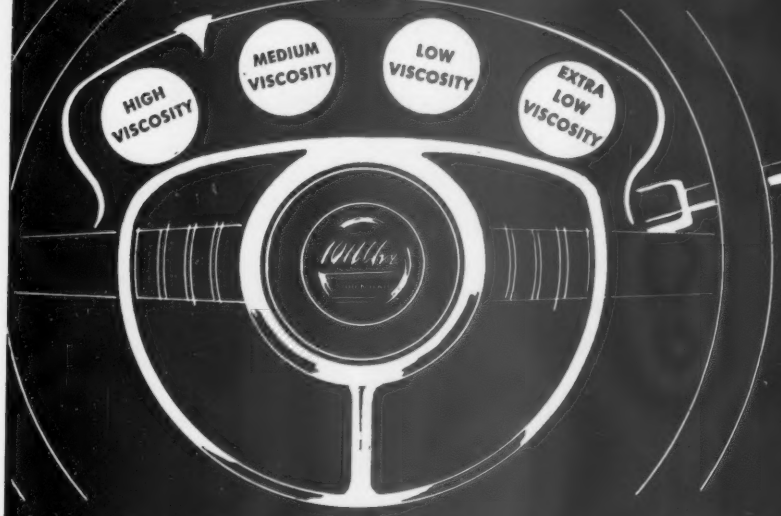
Givaudan Corp. Adds Two Floors To its Delawanna, N. J. Plant

As part of its expansion program, The Givaudan Corporation of New York, N. Y., has added two floors to to the recently completed plant at Delawanna, New Jersey.

The new floors will house the executive offices of the plant as well as the research laboratories and the engineering department.

Givaudan now has ten laboratories, including two abroad, in which it is conducting research on materials used in the paint field and other industries.

ATTENTION *Mr. Paint Formulator:*



the SHIFT is to Marbon "9200"

Soluble High Styrene Paint Chips and Paint Resin

FOR EASIER FORMULATION · MORE FLEXIBILITY IN FORMULATING!

Marbon "9200" paint resins are made in four different viscosity grades; HV, MV, LV, and LLV. Proper choice of the resin eliminates pigment manipulation for proper body and allows maintenance of viscosity at any given solids.

Use Marbon "9200" LLV for spraying and for high-build films; use MV and LV grades for general purposes; use HV grade for high body at low solids.

GET THE FACTS — *Write* TODAY FOR TECHNICAL LITERATURE

Marbon

MARBON CORP.

GARY, INDIANA

SUBSIDIARY OF BORG-WARNER

MARBON . . . Your Buy-Word for Product Perfection

the proof's in the lacquer..

with DIISOBUTYL KETONE

AS A SOLVENT

You can't taste the proof of excellence in lacquers, but you sure can see it . . . especially when you formulate with diisobutyl ketone in nitrocellulose lacquers. This high boiling solvent aids in controlling the evaporation rate and markedly improves blush resistance. Its evaporation rate also makes it equally valuable in formulating spray lacquers, brushing lacquers, and lacquer emulsions.

AS A DISPERSANT

Diisobutyl ketone is the best all-round dispersant for organosol-type resins based on VINYLITE resin VYNV. It is possible to prepare films having less than 15 per cent plasticizer when diisobutyl ketone is used.

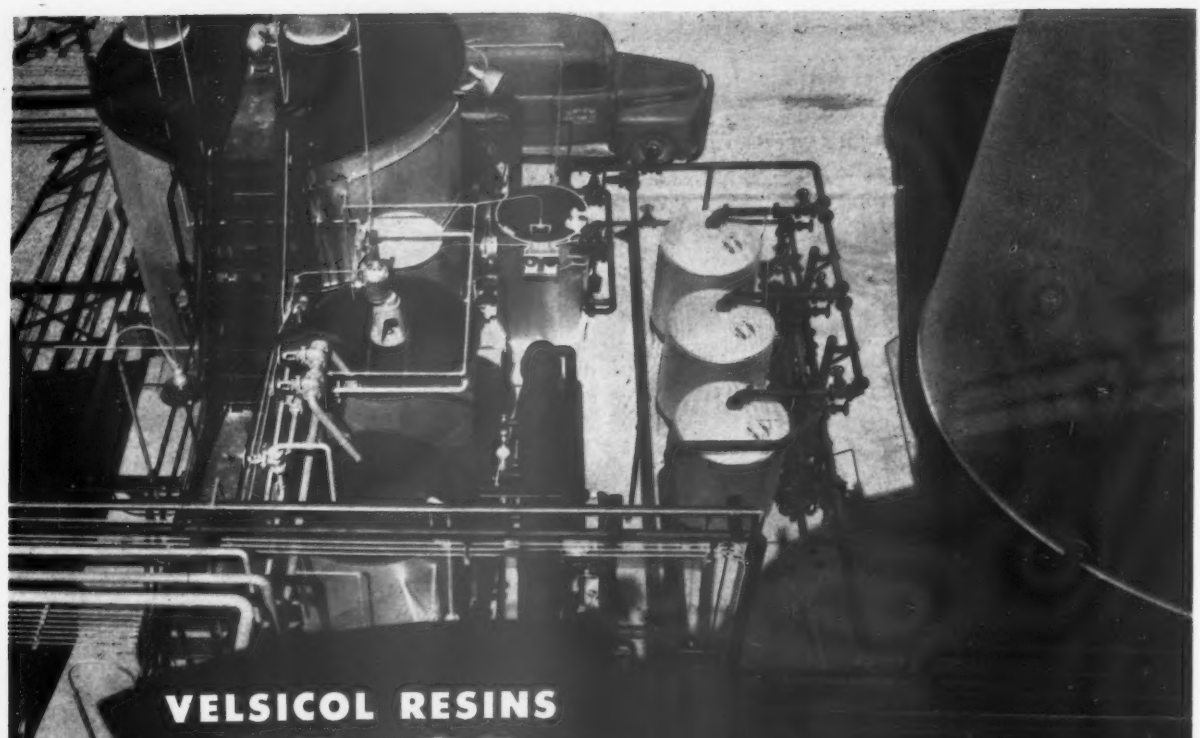
CARBIDE
AND CARBON
CHEMICALS

Carbide and Carbon Chemicals Company
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

For Further Information...

For further information on diisobutyl ketone, concerning properties, prices, delivery, and uses, call or write for your copy of our technical information sheet (F-6934). We have offices in principal cities. In Canada: Carbide and Carbon Chemicals, Limited, Toronto.

The term "Vinylite" is a registered trade-mark of Union Carbide and Carbon Corporation.



VELSICOL RESINS AD·21 AB·11·2

For High Lustre, Good Leafing Aluminum Paints

Velsicol Resins AD-21 and AB-11-2 are especially suitable for economical excellent quality aluminum vehicles and ready-mixed aluminum paints. These neutral hydrocarbon resins are soluble in both aliphatic and aromatic naphthas, and are compatible with bodied vegetable and marine drying oils. They impart fast-drying characteristics. Solutions of the resins have high surface tension properties which promote leafing and flooding of aluminum pigment. The non-acidity of the solutions favors long leaf retentivity. AD-21 and AB-11-2 are available in either solid or solution form. For information and advice about their use, write to the Velsicol Corp. Technical Department.

OTHER SUGGESTED APPLICATIONS FOR VELSICOL RESINS

- Floor and trim vehicles.
- General utility varnishes.
- Traffic paints.
- Extenders for 100% oil soluble phenolic resins.
- Extenders for Chlorinated rubber.
- Metal primers.
- Drum coatings.
- Decorative can enamels.
- Grinding liquids.

PROPERTIES

- Low degree of solvent retentivity.
- Non-acidic.
- Non-saponifiable.
- Coatings resistant to water, aqueous acids and alkalis.
- Soluble in aliphatic and aromatic naphthas.
- Compatible with vegetable and marine drying oils.
- Vehicle films are hard, flexible and adherent.
- Resin solutions promote excellent leafing and flooding of aluminum pigment.

PETROLEUM DERIVED CHEMICALS
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SERVING BASIC INDUSTRIES

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330 East Grand Avenue, Chicago 11, Illinois

Export Division
100 East 42nd Street, New York 17, New York

REPRESENTATIVES IN PRINCIPAL CITIES

News of Paint and Varnish Production Club Meetings

New York

The last regular meeting was held May 7. Honored guests included Gus Wescott, president of the Federation and Dr. Cal Obermeyer, the president-elect.

Dr. C. P. Rassweiler

Dr. Obermeyer demonstrated the use of the Color Aptitude Test, a means to determine what ability a person has in discriminating between narrow color differences.

Henry Payne reported that the Mattiello Memorial collection now contains more than 500 volumes of technical books pertaining to the Paint and Varnish industry.

Dr. C. F. Rassweiler of the Johns-Manville Corporation, speaker of the evening, discussed The Role of the Paint Chemist in Modern Business Management.

A brief of Dr. Rassweiler's talk follows:

Modern management is a matter of evolution and is showing three trends today. Separation of function, an increase in delegation of responsibility and an increase in growth. An example of separation of function would be where Research was originally a part-time project that was worked on between the regular functions of a company and during slack times. Today many companies have Research set up as a full time project.

This job creation opens a position for someone in the organization that did not exist previously. It is therefore up to the chemists of industry to be aware of the potential and be ready to foresee the opportunity that he might otherwise miss when his company reaches a size when this separation of function occurs.

The Delegation of Authority begins when an organization reaches a point when it is no longer possible for one man to run the whole show. Management becomes an integration of groups needed to run the organization. The head of each sub-group should try to determine how extensive his delegated authority is in order to be of most service to his superior.

The lower echelon usually know the details of the work involved much better than their bosses. They therefore, should organize the facts of the situation so they will be of the most benefit to their bosses. At the same time they should try to absorb the evaluation benefits that they in turn can get from their bosses wider overall experiences.

The paint chemist must understand what he should do to gain for himself and his organization the kind of reputation which will result in delegation to him of the responsibilities which he should carry if the management setup of his company is to have maximum effectiveness.

Today, there is great emphasis on growth because of the existing economic and tax situations. New growth creates a demand for technical men. It is the technical men who usually develop the new products necessary for that growth. It is therefore a necessity that the technical men continue to keep abreast of the scientific developments taking place if they wish to continue to progress and advance in their respective fields of endeavor.

A Symposium on Corrosion Preventing Paint Coatings was held at a special meeting, May 13. The subjects covered were:

Metal Surface Preparation, L. R. Whiting, Development Engineer, Bakelite Division, Union Carbide & Carbon Corp.

Environment Application and Other Influencing Factors, H. F. Payne, American (Technical Editor) American Cyanamide Co.

Paint Coatings—Atmospheric Exposures, Joseph Bigos, Director of Research, Steel Structures Painting Council, Mellon Institute.

Paint Coatings—Water Exposures, R. P. Devoluy, Technical Director, C. A. Woolsey Paint & Color Co., Inc.

Northwestern

The Silver Anniversary was held May 1. Speaker of the evening was Bill Gove of the Minnesota Mining Co. who recently returned from Europe as a member of Operation Enterprise. He commented on the willingness of American industry to divulge technical information.

Jack Schulte was called on to recall the events which lead to the founding of the club in 1928; the fourteenth member of the Federation of Paint and Varnish Production Clubs. He was given an inscribed memento in the form of a tie clasp. George Hough, president, 1933, Ed Marwin, president 1934, and Tom McMahon, honorary member, were also so honored. John C. Gehand, Leslie Green and Pat Warren, also charter members, were unable to attend the meeting. Mementos were mailed to them.

Gus Wescott, president of the Federation, addressed the meeting, outlining the national group's activities. Cal Obermeyer, president-elect, discussed the *Color Aptitude Test.*

Philadelphia

Speaker of the evening at the May 20th meeting was T. C. Patton, Chief, Sales Service Department, Baker Castor Oil Co. His paper, *Kauri-Reduction—It's Prediction and Interpretation*, defined the properties measured in the test, a summary of test methods to determine film flexibility and variables effecting the test results.

The following men were nominated for election to serve as officers in the coming year: president, P. J. Whiteway, Jr.; vice president, F. M. McNerney; secretary, J. A. Davis; treasurer, D. T. Niven; assistant treasurer, E. G. Fleming; advisory committee, R. Toothill; advisory committee, J. P. Snyder.

C-D-I-C

The 330th meeting was held at the Hotel Alms in Cincinnati, Ohio, May 11.

Officers elected for the coming year are: Walter Ziegler, President; Robert W. Lipp, Vice President; William Foy, Secretary; Dr. Carl Opp.

Speaker of the evening was Clovis Adams of the Sherwin-Williams Company who spoke on *A New and More Efficient Type of Leaded Zinc Oxide for Use in House Paints.*

The talk covered the various types and forms of lead used in house paints. One of the major points brought out was the use of pigments with a high lead content to develop more lead soaps and also, by co-fuming the lead and zinc, to block the action of the more active components thereby controlling the ratio of lead to zinc soaps. Tests so far show good general performance and good package stability with the use of the more highly efficient lead component.

Slides were used to illustrate parts of the lecture.

It's adaptable...

...that's why factory chemists recommend

"Lead" performs a variety of jobs in the formulation of exterior paints.

"Dutch Boy" Basic Silicate White Lead "45X" does all these different jobs . . . alone. With new efficiency, new economy! This, in a nutshell, is why factory chemists recommend it so unreservedly.

Take white House Paints, for example. "45X" improves their self-cleaning properties. Permits rain to wet the surface uniformly, thus washing off the dirt.

Or take Primers. "Dutch Boy" Basic Silicate White Lead "45X" provides the lead soaps that increase adhesion. On top of this, it gives the film the water resistance needed to maintain a primer's adhesive bond and help prevent peeling.

Then take tinted House Paints. "45X" increases film durability and resistance to color change. It also promotes dirt removal because of its hydrophilic properties, and thus helps keep colors clean and fresh.

Finally, take Porch and Floor Enamels. "45X" plasticizes the film and increases its abrasion resistance. What's more, it forms lead soaps that contribute to the flexibility and water resistance of the film, and thus improve adhesion.

"Lead" at its adaptable, economical best, "45X" is now being used by most leading paint makers. Put it to work improving your exterior formulations.

More economical, too!

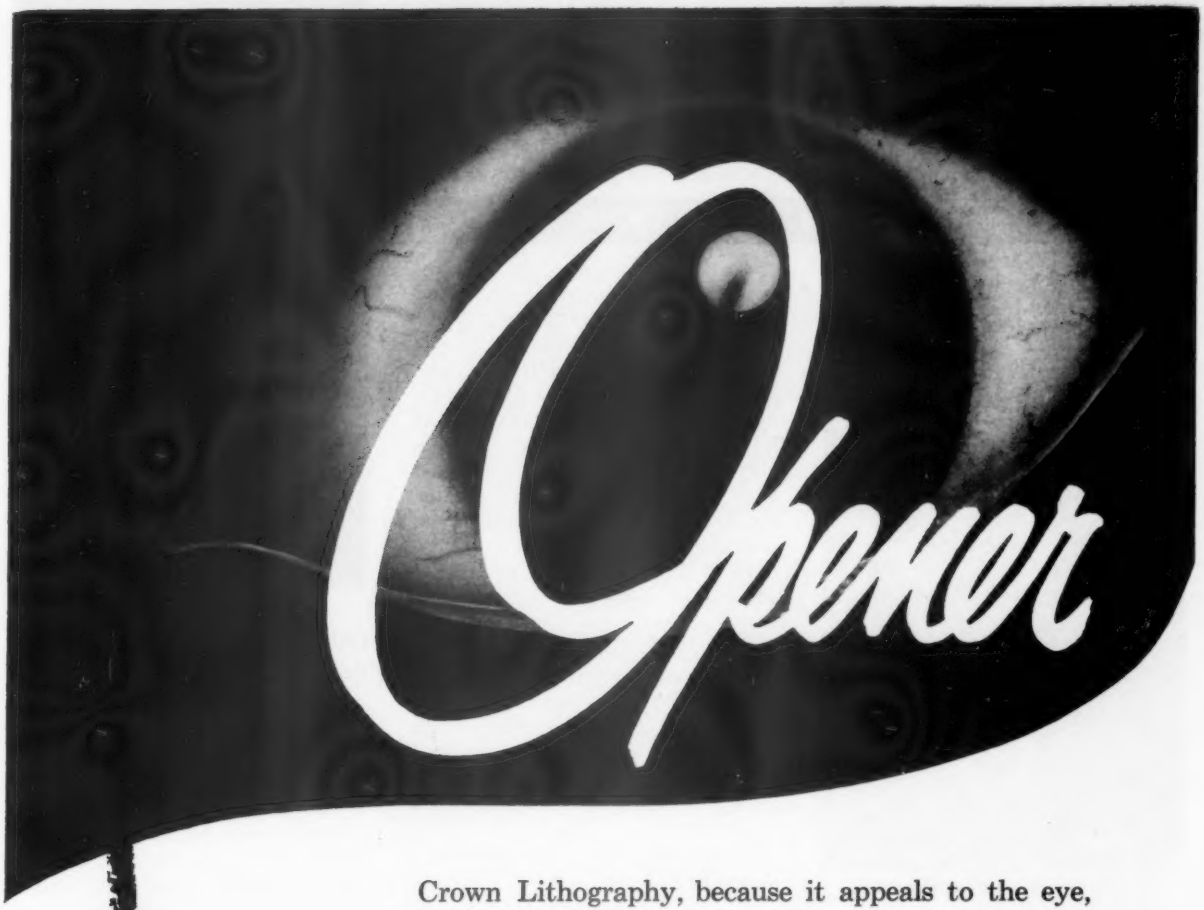
In adaptable "Dutch Boy" Basic Silicate White Lead "45X," the reactive portion of each pigment particle is concentrated at the surface. This makes available proportionately larger amounts of "lead." So you use fewer pounds than with other white lead types.

Dutch Boy* **Basic Silicate White Lead "45X"**

*Reg. U.S. Pat. Off.

for exterior paint formulations

National Lead Company: New York 6; Atlanta; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; Dallas 2; Philadelphia 25; Pittsburgh 12; St. Louis 1; San Francisco 10; Boston 6 (National Lead Co. of Mass.).



Crown Lithography, because it appeals to the eye, creates the urge to buy. And Crown Lithography implies *everything* in decorated cans and pails... even the services of artists who are creating an entire new school of packaging thought with "Modern Design Labeling." Ask your Crown Sales Representative to show you eye-opening visual samples of the exciting work of these artists. Then judge for yourself whether Crown Lithography won't open up new sales horizons for you.

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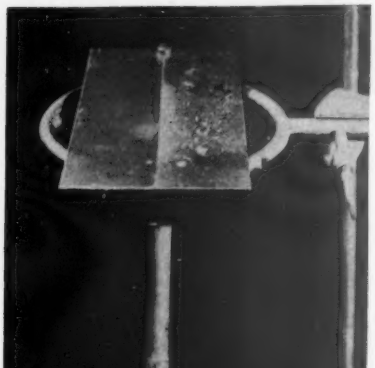
NEW MATERIALS & EQUIPMENT

A MONTHLY MARKET SURVEY

This section is intended to keep our readers informed of new and improved products. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



DOW CORNING

SILICONE RESINS

Various Applications

Four silicone resins that further extend the field of application for silicone-based protective coatings are available:

Dow Corning 805 resin is claimed to retain excellent flexibility and adhesion, after long aging at elevated temperatures. At 600 to 1000 deg. F., finishes formulated with this silicone resin have twice the thermal life of paints made with the earlier resins, and 10 to 30 times the life of high temperature organic finishes. Applications for such silicone finishes include paints for hot stacks, mufflers, exhaust manifold and industrial pipe lines, coatings for space heaters, incinerators and domestic appliances, and color films for lamps and bulbs.

Dow Corning XR-807 is an air drying modified silicone-alkyd resin. According to the manufacturer, clear and pigmented coatings made with this resin have excellent weather resistance, color retention and resistance to chalking. This particular silicone resin is recommended in the formulation of exterior paints. XR-807 is compatible with most alkyd and phenolic varnishes and amine resins. It is reported that these silicone alkyd resins can also be combined with nitrocellulose to give greater flexibility, adhesion, and cold-check resistance.

Dow Corning 129G and XS-1 are water repellents. 129G resin is used in most silicone-based masonry repellents. Elimination of efflorescence and staining is claimed of water repellents made with this resin. XS-1 is a water soluble resin which shows promise as a water repellent treatment for paper, wood, glass, asbestos, brick and concrete.

Photo: Single 1-mil coating of silicone-aluminum paint was applied to left half of test panel and right half was similarly coated with conventional aluminum paint formulated for high temperature applications. The panel was then baked and exposed to a bunsen burner. The organic paint is badly blistered and peeled after a few minutes while the silicone finish is unaffected by surface temperatures in the range of 1000 deg. F., only slightly deteriorated by temperatures of 1500 deg. F. over the flame.

Dow Corning Corp., Midland, Mich.

MAGNESIUM

ELWELL-PARK

CARTON AND DRUM CLAMP

Requires No Skid or Pallet

Combination carton and drum clamp can handle both types of containers without the use of skid or pallet. It is said that this clamp is adaptable to all the firm's center-control, sit down fork trucks.

The clamp arms are designed for handling units of cartons; the slotted portion of the arms permit clamping of standard drums without interference of the drum's rolling ribs. The clamping device is designed for loads having good dimensional stability and solid containers with contents which are of a non-fragile nature. Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

FORK TRUCKS

Ease of Operation

Models YC-40 and UC-30 fork trucks have capacities of 3,000 and 4,000 pounds. Features are said to be compactness, durability, and maneuverability. Other claims include safety, serviceability, operator and ease of operation. Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oregon.

HAND TRUCK

Light Weight

Magnesium hand truck weighs 18 lbs. and has capacity of over 500 lbs; all-bolted construction for easy replacement of parts. Magnesium Co. of America, East Chicago 19, Indiana.

NEW MATERIALS — EQUIPMENT

MOREHOUSE

LABORATORY MILL

For Control Work

Processing mill is especially adapted to laboratory processing and control work. This mill is the smallest in the firm's line, stands 23¼" high, is 8¼" in diameter and weighs only 41 lbs. One of the large uses of this mill is the grinding and processing of paint. It operates on the principle of a Carborundum stone revolving at high speed against a stationary Carborundum stone. Material to be processed is fed between the stones. The manufacturer claims that this mill is an ideal installation for laboratory development work, since formulation and control work can be done quickly and the product taken directly to a larger mill for volume production. Throughput rates vary from one to three gallons per hour depending upon the material. Morehouse Industries, 1156 San Fernando Rd., Los Angeles 56, Calif.

AIR REGULATOR

Can Handle Large Volumes

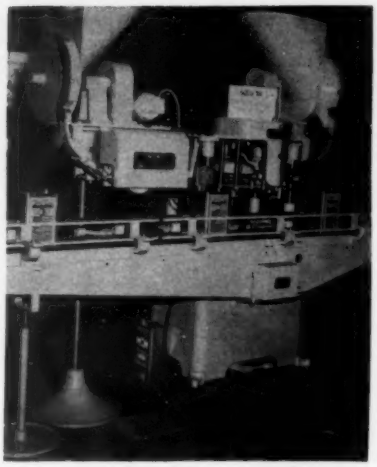
Air regulator is capable of handling large volumes of compressed air with a minimum of pressure drops. Type HAA regulator has capacity of 80 CFM at 100 pound line pressure. Maximum pressure which can be regulated is 135 psi. For complete details write: The DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio.

CAPPING MACHINE

Automatic Type

This machine performs two operations: applies the caps or closures to bottles or cans, and then applies a tamper proof metal band that is crimped in place and scored so that it can be easily torn off. The Upressit closure releases its grip when finger pressure is applied at its center, and it can be reused indefinitely.

Capacity is 60 pint or quart containers per minute or 40 one-gallon containers, or 30 two-gallon containers. For complete details write to Upressit Products Corp., 420 Lexington Ave., New York 17, N. Y.



UPRESSIT

Castor Oil now unrestricted for Industrial Uses!
Spencer Kellogg's
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. . . Spencer Kellogg's SYNTHENOL Dehydrated Castor Oil for Alkyds and Varnishes
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Write to the Kellogg Technical Service Department for application data
SPENCER KELLOGG AND SONS, INC.
BUFFALO 5, N. Y.
The First Name in Vegetable Oils

All through the Night
WEATHER-OMETERS

like this are operating unattended in hundreds of industrial laboratories to determine the resistance to rain, heat, sunlight, and thermal shock of a wide range of materials intended for outdoor use.

A few days' testing in the Weather-Ometer is equivalent to months of exposure in actual use.

The operation of the Weather-Ometer is fully automatic. After setting exposure cycles by placing the proper cam on the cycle timer unit, the machine may safely be left in continuous operation over night without attention other than to replace carbon electrodes.

The Carbon Arc, the closest known duplicate of sunlight both as to intensity and spectral distribution, is used in all Atlas Weather-Ometers as the source of radiation. Water spray, thermal shock, temperature control, and light exposure periods are all regulated automatically according to test requirements.

Both original research testing in designing new types of products and daily testing for quality control in production are performed by the Weather-Ometer with equal assurance of positive dependable results.

Types of products tested in Weather-Ometers include: —

Aeronautical parts and instruments.
Automotive parts and finishes.
Bitumens and related products, including roofing, paints, siding, etc.
Dyestuffs, Chemicals and Plastics.
Rubber and related products.
Textiles, clothing and canvas goods.
Utilities, wire and cable

A few well-known companies using Weather-Ometers are: —

American Steel & Wire Co.
Kennicott Wire & Cable Co.
U. S. Finishing Co.
National Bureau of Standards
U. S. Naval Clothing Dept.
Goodyear Tire & Rubber Co.
National Lead Co.
Sears, Roebuck & Co.
American Paint & Chemical Co.
American Cyanamid Co.
Johns-Manville Corp.
Celotex Corp.
Fisher Body Corp.
Boeing Aircraft Corp.
Fairchild Engine & Aircraft Co.
International Harvester Co.

and hundreds of other industrial companies.

Write for bulletin giving complete engineering data on the operation of the Weather-Ometer.

Your weathering test problems will receive personal attention of our engineers.

ATLAS ELECTRIC DEVICES CO., 361 West Superior Street, Chicago 10, Ill., U.S.A.

MANUFACTURERS OF ACCELERATED TESTING EQUIPMENT FOR OVER A QUARTER OF A CENTURY

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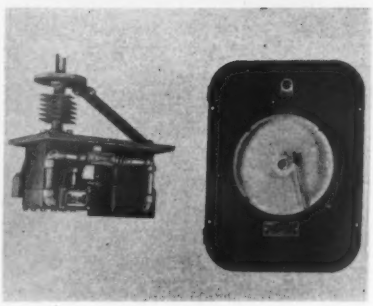
NEW MATERIALS — EQUIPMENT



NORCROSS

VISCOMETER

Recording Type

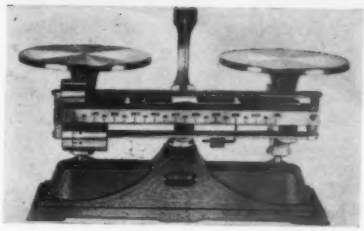
New model viscometer is designed for polymerization processes as encountered in the manufacture of bodied oils, resins, varnishes, paints, etc. According to the manufacturer, this instrument records the viscosity of the product on a 24-hr. chart showing the viscosity build up. These viscometers are furnished with an alarm which can be adjusted to signal the proper termination point for the process. This instrument can be applied to the reactor kettle. For complete details, contact the Norcross Corp., 247 Newtonville Ave., Newton 58, Mass.

FORMALDEHYDE

Solid Form

Solid form of formaldehyde contains less than one-tenth of one percent water and is sold under the trade name "Superfyde." According to the manufacturer, this product is similar to paraformaldehyde in chemical structure, but has both a higher molecular weight and higher melting point. In resin manufacture, "Superfyde" is adapted to uses that differ from paraformaldehyde applications. Because it reacts more slowly than paraformaldehyde at normal temperatures but reacts readily at elevated temperatures, it is most useful when very slow resinification is desired or when final hardening of the resin is accomplished by heating. Heyden Chemical Corp., 342 Madison Ave., New York 17, N. Y.

NEW MATERIALS — EQUIPMENT



OHAUS

BALANCE
Has Micrometer Poise

Manufacturer claims balance can be used for a range from 0.5 to 1000 grams without additional weights. Poise may be slid along the beam for rapid traverse and rotated for final positioning. Poise barrel is calibrated in 0.5 gram increments which subdivide the 10 gram beam divisions. Capacity is 5,000 grams, sensitivity 0.5 gram. Equipped with undivided tare beam of 1 pound capacity. Ohaus Scale Corp., 1050 Commerce Ave., Union, N. J.

CADMIUM YELLOWS
Readily Dispersible

Cadmium lithopone yellows, according to the manufacturer, have increased dispersibility and decreased tendency to flocculate, and as a result they can be rapidly incorporated in all types of vehicles such as latex emulsion systems. The surfaces of these pigments are wetted equally well by aqueous and organic vehicles, which is an important factor contributing to the stability of emulsion paints. Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio.

NON-DRIP CAN
Nozzle Topped

Round, tinless, nozzle-topped can which is drip-proof and the exposed side seam eliminated (permitting around-the-can lithography) has been introduced. The dripless feature of the can was accomplished by designing a turned-in lip to form the mouth of the nozzle which cuts off the flow of liquid after pouring. American Can Co., 100 Park Ave., New York, N. Y.

YOUR BIG NEWS IN PIGMENTS...WILLIAMS NEW KROMA RED !

Gives you far brighter mass color, much cleaner tint, is more easily dispersed than any red iron oxide pigment yet produced!

MEANS THAT YOU CAN NOW USE A LOW COST IRON OXIDE PIGMENT FOR WORK WHERE MORE BRILLIANT COLORS ARE REQUIRED FROM LIGHT RED TO DEEP MAROON

Chemical and Physical Properties	
Fe_2O_3	95.0% MIN.
Sp.G.	4.80
Oil ABS.	21-22
Hiding SQ. FT. per LB.	850-1,000

KROMA RED applications:
- Toy and furniture enamels
- House and barn paints
- Floor enamels
- Resin and latex emulsion paints
- Automotive finishes
- Camouflage (high infrared reflectance)
- Rubber products
- Plastics
- Textile finishes
- Floor coverings
- Building materials
- Cement products
- Leather finishes
- Paper

. . . and many other uses.

Write today for complete technical report on Kroma Reds—entirely new iron oxide pigment. Address Department 23, C. K. Williams & Co., Easton, Pa.

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108 SHADES AND TYPES OF IRON OXIDE PIGMENTS

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Paint Filler with Cover Dropper & Capper

The Elgin Model 'H' fills oil and water base paints, places covers, and seals all sizes of cans with double friction covers (1/32 gal. to 1 gal.) — *completely automatic.* Quick changeover and ease of cleaning are additional features which account for the popularity of the Model 'H' in both large and small plants.

Write Today for New Folder illustrating Elgin Equipment — Address Dept. VA

ELGIN MANUFACTURING COMPANY • 200 BROOK STREET ELGIN, ILLINOIS

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260 West Broadway
New York 13, N. Y.

CANADIAN REPRESENTATIVE
Richardson Agencies, Ltd. 454 King Street W. Toronto

NEW MATERIALS — EQUIPMENT

LOW VISCOSITY BUTYRATE
For Formulation of Lacquers

Half second cellulose acetate butyrate is recommended for formulating lacquers of all types, paper finishes, etc. According to the manufacturer, wood lacquers formulated with this material afford a higher degree of protection against ultraviolet light than conventional lacquers. It said that such lacquers can withstand 10 "cold check" cycles. It is also claimed that metal lacquers of this type exhibit good weathering properties, and good retention of low color, do not whiten during underwater immersion tests, nor blister or peel. Other uses include lacquers for plastics such as acrylics, cellophane, phenolics and polystyrene; peelable plastic coatings for the packaging industry; heat sealing adhesive coatings and hot melts. Eastman Chemical Products, Inc., Kingsport, Tenn.

WRITE-ON LABELS
Self-Sticking

Labels are recommended for industrial identification. This particular type combines a printed form and write-on space. A different color background for each wording helps provide instant identification for quick classification. Ideal for formulation labeling in laboratory. W. H. Brady Co., 727 W. Glendale Ave., Milwaukee, Wis.

FIRE NOZZLE
Uses Spiral Fog Principle

Two nozzles, models G-10 and G-15, features improved capacity, coverage, and break-up, according to the manufacturer.

G-15 has fog capacity of 50 gpm and a straight stream capacity of 100 gpm. Used whenever maximum reach and coverage are required, and when water pressure and water supply are adequate.

G-10 is used for inside fire fighting where water damage must be minimized, or for use on long 1½ inch lines and straight stream of 50gpm at 100 psi. Bete Fog Nozzle, Inc., 85 Pierce St., Greenfield, Mass.

STABILIZERS AND THICKENERS
Sodium-Free

Line of sodium-free stabilizers and thickeners for latex paints are available. Known as "Cascoloid", it is claimed that these products are helpful in eliminating effluorescence and frosting which can occur in dark shades. According to the manufacturer, these products remain usable at least one year at room temperature, and if frozen, they may be thawed at room temperature and stirred before use without any loss of efficiency. Another advantage claimed is that because of their high thickening power, these materials allow the use of less stabilizer and provide for greater flexibility in formulations. They are alkaline in reaction, and are compatible with such latices as butadiene-styrene and pre- and post-plasticized polystyrene emulsions. Borden Chemical Co., Chemical Div., 350 Madison Ave., New York, N. Y.

METHYL GLUCOSIDE

AT A *new low price*

Argo Brand Methyl Glucoside of minimum purity of 99% is now available in commercial quantities at a lower price. Besides known uses in esterification, Methyl Glucoside has unexplored possibilities.

When it comes to preparing tall oil esters, Methyl Glucoside in combination with glycerol or pentaerythritol gives improved products that possess higher body and more rapid drying properties.

For fast bodying characteristics in drying oils, Methyl Glucoside is esterified with linseed oil fatty acids. When they are cooked into varnishes with ester, gum or phenolic resins, the Methyl Glucoside preparations are resistant to alkali and water, and are faster drying to hard films with excellent adhesion.

Argo Brand Methyl Glucoside is offered for consumption in the protective coating industry as well as for investigational work for other potential applications. Write for technical information and samples which will be sent upon request.

"Fine Chemicals from Corn"

Chemical Division

CORN PRODUCTS REFINING COMPANY

17 BATTERY PLACE • NEW YORK 4, N. Y.

Personnel Changes

WITCO

Walter J. Gruber has been named to supervise the manufacture of paint driers. He will also be engaged in technical service on these products. Mr. Gruber was formerly with the McGean Chemical Company.

HEYDEN

Arthur R. Broadman has been elected vice president in charge of engineering and purchasing. He had been assistant vice president in charge of engineering since 1948 and is a director of St. Maurice Chemicals, Ltd. Mr. Broadman joined Heyden's Engineering Division in 1939.

A-D-M

Vernon C. Rollins has joined the San Francisco office as a sales representative. He was former manager of a A-D-M chemical-plastics branch sales office in San Francisco. Mr. Rollins is currently president of the Chemical Salesmen's Association of California.

CARBIDE AND CARBON

John Conway has been appointed an assistant sales manager for Industrial Chemicals. He joined the firm in 1935 and was assigned to Carbide's Fellowship at Mellon Institute in Pittsburgh. Most recently Mr. Conway was assistant product manager of the Fine Chemicals Division.

INTERCHEMICAL CORP.

William J. Rothemich, divisional president of the firm's Textile Colors Division, has been elected to the Board of Directors of the Corporation. Associated with Interchemical since 1933 in various technical and executive positions, he was formerly divisional president of the R-B-H Dispersions Division, Bound Brook, New Jersey. Mr. Rothemich is a graduate of Union College.

W. J. Rothemich

ALCOA

Raymond C. Hirsch has been placed in charge of aluminum pigment sales in the St. Louis territory. He was formerly attached to Alcoa's New York and Newark sales offices. Prior to joining Alcoa, Mr. Hirsch was with the Sherwin-Williams Company in Chicago. He is a member of the New York Paint, Varnish & Lacquer Association.

DELAWARE CHEMICALS

Dr. Seligman B. Bamberger has been elected vice president in charge of research and development. He joined Delaware Chemicals in 1950 and served as director of technical service on the use of pentaerythritol in resins as well as supervisor of process development on the production of pentaerythritol.

MATHEWS PAINT

R. W. Janeway, secretary of the firm and production manager, has taken on the additional responsibility of treasurer following the resignation of J. W. Chapman. Assisting Mr. Janeway will be **Gerald F. Carr,** credit manager, and **Don Bennett,** factory superintendent in charge of manufacturing and production.

Charles E. Olsen has joined Mathews Paint as a research and development chemist. **Roy Davis** and **Bob Elliot** have joined the company as factory salesmen.

BAKER CASTOR OIL

Dr. D. L. Van Horn has been appointed to direct the firm's program of castor bean breeding and seed production. He will make his headquarters in the Texas High Plains at Plainview. Mr. Van Horn's background includes work with the U. S. Department of Agriculture's Agronomic Research on castor beans, with emphasis on breeding.

AdcO ODORLESS ALKYUM

No. 185 S

Now, a 100% pure alkyd that is completely free of rosin and resin derivatives. Reduced with an all odorless solvent, it may be used to produce **FLATS . . . SEALERS . . . PRIMERS and ENAMEL UNDERCOATERS that will . . .**

- **Dry hard in 4 to 6 hours**
- **Have excellent ease of brushing and non-penetration**
- **Produce a rugged, scrubbable surface**
- **Maintain long wet edge time (12 to 20 minutes)**
- **Show no brush marks**
- **Impart excellent, non-yellowing color retention**
- **Maintain exceptional suspension properties and package stability**

AdcO 185 S SPECIFICATIONS

Wt. Per Gal.	6.9 lbs.
Viscosity	X-Z
Non-Volatile	25%
Phthalic Anhydride	34-35%
Type of Oil	Soya
Percent of Oil	49-51%
Color	4-7
Resin or Rosin Modifiers	NONE

SEND FOR SAMPLE

AdcO CHEMICAL CO.
148-154 Rome St., Newark 1, N. J.

Send me full information and sample of AdcO Odorless Alkyum, 185 S.

NAME .....

FIRM .....

ADDRESS .....

CITY & STATE .....

148-154 ROME STREET, NEWARK 1, N. J.

AdcO Chemical Company

A DEPENDABLE SOURCE OF SUPPLY FOR QUALITY GRINDING VEHICLES

J. E. Warner

J. D. Hunter

R. E. Kann

W. E. Kelly

GOODYEAR

John E. Warner has been appointed district manager of the Chemical Division's St. Louis office. He joined the firm on the production squadron and became successively a sales trainee specializing in paints, and special representative to the Chicago district.

Robert E. Kann has been named district manager for the Chemical Division's Chicago office. He joined Goodyear in 1951 as a special representative in Chicago.

William E. Kelly has been appointed special representative for the Chemical Division's New York district. He will handle Chemigum rubbers and latices and Pliolite re-inforcing resins.

John D. Hunter has been named special representative for the Chemical Division's midwest district in Chicago. He will specialize in Pliolite resins and latices for the paint industry.

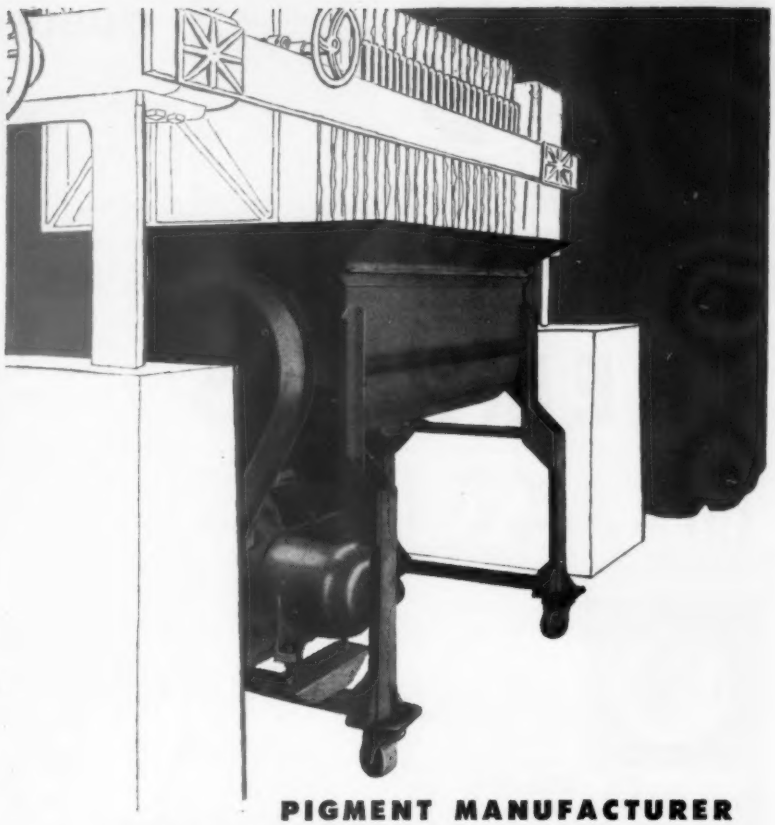
GIVAUDAN

E. R. Durrer has been elected president of the Givaudan Corporation, succeeding Dr. Eric C. Kunz.

DU PONT

Dr. J. Bartlett Sutton, manager of the firm's sales office in San Francisco, has been appointed sales manager of speciality products in the Pigments Department at Wilmington, Del. In his new capacity, Dr. Sutton will be in charge of sales of titanium metal, "Erifon", and other products based on titanium chemistry.

David A. Piguet, a pigments salesman in Detroit, Mich., will succeed Dr. Sutton as manager of the San Francisco office.



PIGMENT MANUFACTURER BREAKS PRODUCTION BOTTLENECK WITH READCO MIXERS

A large producer of water soluble paint pigments faced a problem confronting many management men . . . how to get more production—in a hurry.

In an analysis of his process, a bottleneck was found. Pigment solids were being removed from the emulsion in filter presses. Unmanageable filter cake was being scraped from the presses and shoveled into drums, a costly, time-consuming process.

A series of laboratory tests pointed out the simple solution. A battery of Readco Spiral Ribbon Mixers was installed beneath the presses. These mixers reduce the cake into a homogeneous, semi-liquid mass, ready for shipment. Processing time and costs have been greatly reduced.

You can approach your production problems in the same way. The Read Standard Corporation not only manufactures a broad line of chemical processing equipment, it offers you the services of its engineering specialists and laboratory facilities to assist you in the solution of your special processing problem.

READ STANDARD
CORPORATION

BAKERY-CHEMICAL DIVISION, York, Pennsylvania—Los Angeles 39, California

SOLVENTS and CHEMICALS for LACQUERS

ACTIVE AND LATENT SOLVENTS: Normal and secondary acetates and alcohols . . . glycol ethers and ketones.

DILUENTS: Benzol, toluol, xylol, lacquer diluent naphtha as well as faster and slower evaporating petroleum naphthas for special type finishes.

PLASTICIZERS: Dibutyl phthalate, tricresyl phosphate and a dozen other Ohio-Apex plasticizers to choose from. Plus a full line of glycols and diglycols.

DRUM, TANK WAGON, TRANSPORT. No need to carry top-heavy inventories when our stock is as close as your telephone. Save warehouse space. Use our quick supply service. Call today!

CENTRAL SOLVENTS & CHEMICALS CO.,
2540 W. FLOURNEY ST., CHICAGO 12, ILL.

The SOLVENTS and CHEMICALS GROUP

Distributors for America's Leading Producers
Consult your telephone directory for the address of your nearest Group member:

BUFFALO 7:	Buffalo Solvents & Chemicals Corporation
CHICAGO 12:	Central Solvents & Chemicals Company
CINCINNATI 29:	Amsco Solvents & Chemicals Company
CLEVELAND 11:	Ohio Solvents & Chemicals Company
DETROIT 11:	Western Solvents & Chemicals Company
FORT WAYNE 8:	Hoosier Solvents & Chemicals Corporation
GRAND RAPIDS 9:	Wolverine Solvents & Chemicals Company
HOUSTON 15:	Texas Solvents & Chemicals Company
INDIANAPOLIS 22:	Hoosier Solvents & Chemicals Corporation
MILWAUKEE 14:	Wisconsin Solvents & Chemicals Corporation
NEW ORLEANS 18:	Southern Solvents & Chemicals Corporation
ST. LOUIS 7:	Missouri Solvents & Chemicals Company
TOLEDO 6:	Western Solvents & Chemicals Company

GLIDDEN

NELIO GUM ROSIN

"The Standard Rosin of the World"

7 UNBEATABLE POINTS OF SUPERIORITY . . .

1. Uniform
2. Brilliant and Clean
3. Exclusive Vacuum Process
4. Highly Controlled
5. Low Fatty Acid Content
6. Highly Maleic Reactive
7. Free from Residual Turpentine

This specification rosin assures you the best, most dependable results and frees you from the troubles arising from use of ordinary gum rosins.

Shipped in standard non-absorbent, leakproof metal drums, 100 lb. net weight paper bags or fluid in insulated tank cars. Grades WW through H. Write for samples and prices.

THE GLIDDEN COMPANY - NAVAL STORES DIVISION

E. W. COLLEDGE

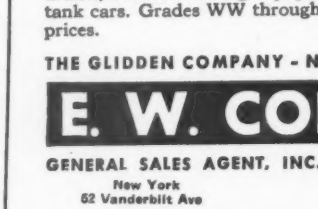
GENERAL SALES AGENT, INC., JACKSONVILLE 1, FLA.

New York
62 Vanderbilt Ave

Chicago
25 E. Jackson Blvd.

Cleveland
2776 South Moreland Blvd.,
At Shaker Square

San Francisco
503 Market Street



He's right! For example,

RAYBO 77-AlGel makes aluminum octoate gels without heat!

Consider its use in odorless flats.

Other problem-solving RAYBO chemicals:

RAYBO 3-AntiSilk	RAYBO 41-Spangle
RAYBO 6-AntiSag	RAYBO 43-MarHard
RAYBO 15-FloInducer	RAYBO 62-Disperse

Perhaps one of these additives is the key to improvement of YOUR product. Write today for technical data sheet or sample.

raybo

CHEMICALS THAT SOLVE PROBLEMS

RAYBO CHEMICAL CO.
HUNTINGTON, W. VA.

MARBON

Joseph G. Cullen has been appointed technical sales representative in the New England area. Prior to this assignment, Mr. Cullen was purchasing agent and assistant to the president of the Beebe Rubber Company, Nashua, New Hampshire, and has served on advisory committees for the Elastic Colloid Corporation and Sole Institute. He is a member of the Boston Rubber Group and Rhode Island Rubber Group.

J. G. Cullen

GLIDDEN

Herbert E. Miles has been appointed director of the firm's Nubian Industrial Division, Midwest Region. He succeeds **Chester C. Johnson** who retired May 1, after directing the Glidden Division for 24 years. Mr. Miles joined Glidden in 1933 as a formulator in the Cleveland laboratory. Most recently he was superintendent and assistant regional director, Nubian Industrial Division, Chicago. Mr. Miles is a member of the Chicago Paint, Varnish and Lacquer Association, and the Chicago Paint and Varnish Production Club.

H. E. Miles

David W. Jones has been named paint division sales manager for the company's Central Sales Region. The area includes Ohio and portions of West Virginia, Michigan, Pennsylvania, Indiana and Kentucky. Mr. Jones joined Glidden in 1948 as a sales trainee. **Paul A. Beavin,** a member of the Wisconsin trade sales force will succeed Mr. Jones as manager of the firm's Omaha, Neb., branch.

Hans L. Kohler has been appointed sales manager for the Southern and Texas Region. Formerly manager of Glidden's Memphis branch, Mr. Kohler will now make his headquarters in Dallas, Tex. He joined the firm in 1942. Mr. Kohler will be replaced in Memphis by **N. T. R. Burton,** a salesman in the Mississippi Region. He joined the firm in 1948.

PENNSYLVANIA INDUSTRIAL

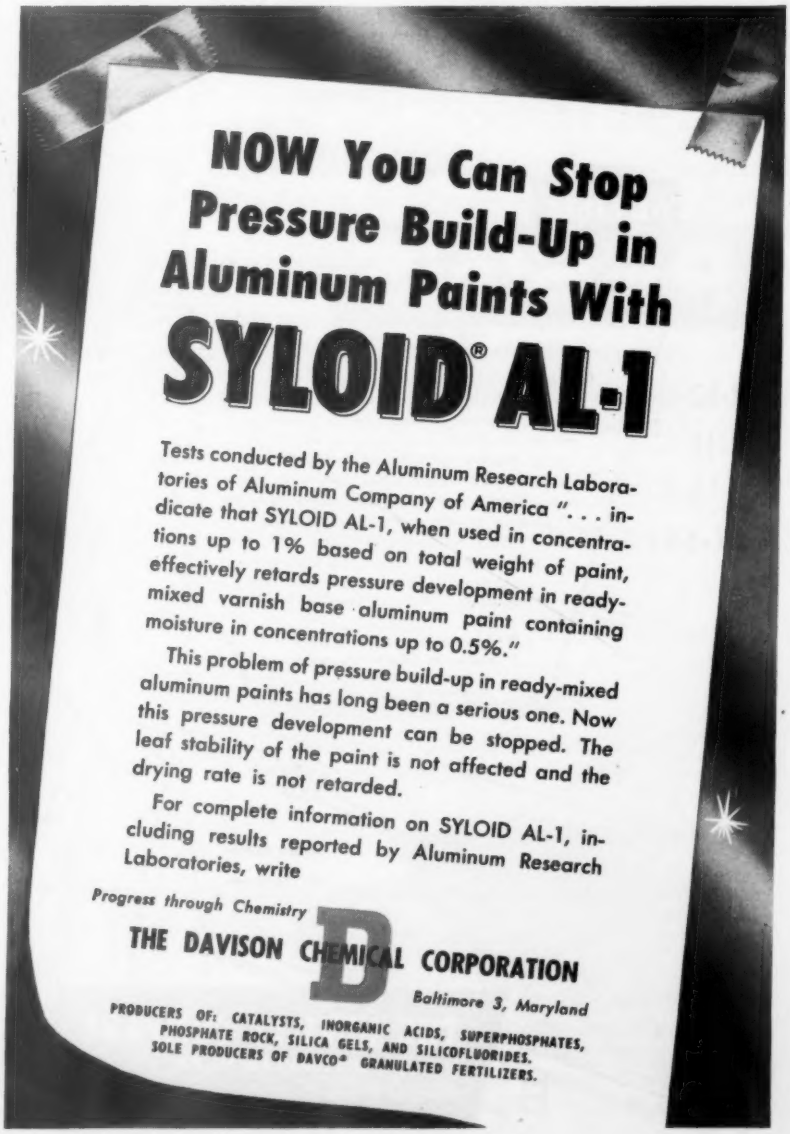
Jack L. Wilson has been appointed director of sales. He will continue to serve as assistant to the president. Mr. Wilson has been associated with the company for five years as assistant to the vice president and assistant to the president. Prior to joining the Pennsylvania Industrial Chemical Corporation, he did engineering design work on heat transfer equipment.

J. L. Wilson

SELAS

Richard S. Van Note has been appointed manager of the Chicago office of the Selas Corporation. Mr. Van Note was associated with the Davison Chemical Company and the C. M. Kemp Manufacturing Company before joining Selas in 1949. In Chicago he will serve as district sales manager for the heat processing and fluid processing equipment.

R. S. Van Note


NOW You Can Stop Pressure Build-Up in Aluminum Paints With
SYLOID® AL-1
Tests conducted by the Aluminum Research Laboratories of Aluminum Company of America ". . . indicate that SYLOID AL-1, when used in concentrations up to 1% based on total weight of paint, effectively retards pressure development in ready-mixed varnish base aluminum paint containing moisture in concentrations up to 0.5%."
This problem of pressure build-up in ready-mixed aluminum paints has long been a serious one. Now this pressure development can be stopped. The leaf stability of the paint is not affected and the drying rate is not retarded.
For complete information on SYLOID AL-1, including results reported by Aluminum Research Laboratories, write
Progress through Chemistry
THE DAVISON CHEMICAL CORPORATION
Baltimore 3, Maryland
PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, AND SILICOFLUORIDES.
SOLE PRODUCERS OF DAVCO® GRANULATED FERTILIZERS.

NAUGATUCK

Donald E. Fowler has been named to the new post of assistant sales manager of the latex and aqueous dispersions group. Mr. Fowler, with Naugatuck Chemical since 1928, was formerly manager of the colloidal products research and development group.

Thomas D. Ramsey and **Bradley A. Smith** have been appointed technical sales representatives on the West Coast. Mr. Ramsey joined Naugatuck Chemical in 1946, and was formerly production engineer at the Los Angeles plant. Mr. Smith has been with Naugatuck Chemical since 1951. He was formerly a chemical engineer with the Firestone Rubber Company.

Lawrence H. Bruce has been named a technical sales representative in the New York area, and **Arnold P. Paulk** technical service manager at the Los Angeles plant.

Mr. Bruce, with Naugatuck for about 10 years, was most previously assistant to the sales manager. Mr. Paulk, associated with the firm about 11 years, has been concerned with latex and latex products.

Albert M. Stover, formerly manager of Marvinol plastic development, has been appointed assistant to the director of research and development. In his new assignment, he will work principally on the development of new products. Mr. Stover has been with Naugatuck since 1949.

for concrete-curing compounds!
NEVILLE
RESINS
R-12
R-16
R-16-A
LX-685
For producing concrete curing compounds, Neville Coumarone Resins offer important advantages . . . ease of formulation, low cost, waterproofness! Neville LX-685 is especially recommended where after-yellowing must be kept to a minimum, important for several government specifications.
Insure minimum moisture loss, good adhesion to surfaces and high resistance to early rainfall and abrasion . . use Neville Resins!
● These resins may also be supplied in solution in suitable solvents in drums and tankcars.
Write today for samples
THE NEVILLE COMPANY
PITTSBURGH 25, PA.
Plants at Neville Island, Pa., and Anaheim, Cal.

E. F. Seeback

R. W. Cornell

PITTSBURGH PLATE

Reuben W. Cornell has been appointed factory manager of the firm's Linseed Oil Division, Red Wing, Minnesota. Prior to his appointment, Mr. Cornell served as production manager of the Linseed Oil Division for 22 years. He is a member of the American Chemical Society, American Oil Chemists Society, National Production Club and the American Paint, Varnish and Lacquer Association. In his new position, Mr. Cornell succeeds **Ernest F. Seeback** who retired after more than 30 years' service with the firm. Mr. Seeback was factory manager for 21 years.

Michael J. Batenburg has been named general advertising manager and **Richard W. Dittmer** has been appointed assistant director of public relations, both newly created positions.

NAFTONE

Alonzo H. Searl, has been named sales manager of the Midwest Division, with headquarters at Chicago. In his new position, he will give technical assistance to Naftone agents in Illinois, Wisconsin, Minnesota, Iowa, Kansas, Missouri and Indiana. Mr. Searl was formerly a research engineer at Battelle Memorial Institute. He was also associated with the Research Laboratory of Armstrong Cork Company at Lancaster, Pa., where he headed the Tile Research group. Mr. Searl is a member of the American Chemical Society and the American Association for the Advancement of Science.

Alonzo H. Searl

McCLOSKEY VARNISH

S. Ken Tyson, general manager of the Los Angeles and Portland, Ore., subsidiaries, has been elected vice president of the parent firm. **Donald C. Jarden** has been elected secretary and **Frank C. Peck,** national sales manager of trade sales.

a new film former—

HALF-SECOND BUTYRATE

Eastman announces the production of a low viscosity cellulose acetate butyrate.

For the first time the protective coating industry can take advantage of the outstanding characteristics of cellulose acetate butyrate in a form that permits its use in formulations requiring a high non-volatile content. The high solubility of half-second butyrate, plus its slow viscosity build-up in economical solvents such as toluene and ethyl alcohol open up entirely new fields to this unique cellulose polymer.

Safely shipped and easily handled as a dry powder, half-second butyrate produces films of low color and high clarity with excellent strength and flexibility at both normal and low temperatures. Extremely stable in the presence of ultraviolet light, half-second butyrate films retain their initially low color, high strength and flexibility for long periods, both indoors and out. No other easily sprayable film former exhibits these characteristics to such a high degree.

In addition, half-second butyrate films possess excellent abrasion resistance and are little affected by prolonged underwater immersion or rapid temperature changes.

Whether you are familiar with cellulose acetate butyrate or not, it will pay you to investigate half-second butyrate.

If you are concerned with the development or use of

WOOD FINISHES

METAL LACQUERS

PLASTIC FINISHES

PAPER LACQUERS

CLOTH FINISHES

MELT COATINGS

HEAT SEALING ADHESIVES

investigate Eastman half-second butyrate

We will be pleased to send you samples of half-second butyrate and formulation suggestions. Write to EASTMAN CHEMICAL PRODUCTS, INC., Chemicals Division, KINGSPORT, TENNESSEE.

Eastman
CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE

Sales representative for **TENNESSEE EASTMAN COMPANY**, a division of **EASTMAN KODAK COMPANY**

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; New York—260 Madison Ave.; Framingham, Mass.—65 Concord St.; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; St. Louis—Continental Bldg.; Houston—412 Main St.; **West Coast: Wilson Meyer Co.,** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—821 Second Ave.

Success of Silicone Products Key to Dow Corning's Growth

A fine example of the adage "When you build a better mousetrap, the world beats a path to your door" is the successful story of the Dow Corning Corporation.

By demonstrating the value of silicone products, Dow Corning has increased its gross sales from $15,000 a month during its first full month of business in 1943, to $1,500,000 a month ten years later.

And Dow Corning is still expanding. It is now investing about 16 million dollars in a new program that will, in a year or two, increase its present productive capacity four times.

Dow Corning was formed in 1943, when the Dow Chemical Corporation joined forces with Corning Glass Works. With a legacy of nine years of basic research in the field of silicone chemistry plus many years experience in chemical processing, and $1,600,000 to invest, Dow Corning scientists developed a family of silicone products, including resins and varnishes which have unique qualities and a great many uses.

The basic research was done by a group of chemists and physicists headed by Dr. J. Franklin Hyde under the general supervision of Dr. E. C. Sullivan, who developed Pyrex glass as research director of Corning Glass Works. He now serves as president of Dow Corning Corporation. That research group was soon joined by another under Dr. Rob Roy McGregor on the Corning Glass Fellowship at Mellon Institute in Pittsburgh.

Part of Dow Corning's new expansion program involves facilities for producing the raw materials used in making silicone products. All of these products are built on a molecular skeleton of alternate silicon and oxygen atoms, similar to that found in quartz, mica and sand.

Among the most successful and widely used silicone products is silicone rubber. Unknown to industry 10 years ago, it has become an important and basically different elastomer among the synthetic rubbers. Because it is built on a heat resistant framework of silicon and oxygen rather than carbon atoms, silicone rubber retains its rubberlike properties at temperatures far above or below the limits of either natural or the other synthetic rubbers.

An essential ingredient in the high strength silicone rubber, known as "Silastic", is "silica soot," a filler characterized by fine particle size and high surface energy.

The use of "silica soot" instead of carbon black as a filler for rubber was developed in Germany by the Segussa Company of Frankfort in the years immediately prior to and during World War II. The American technical teams investigating German industry brought this knowledge back to the United States after the war.

A process for making "silica soot" by burning silicon tetrachloride in combustible gases was invented at Corning Glass Works in 1933-36 by Dr. Frank Hyde of Dow Corning. Dr. Hyde recognized that silica soot could be used as a filler for rubber but that use was then before its time.

Dow Corning's success with silicone products is reflected in its 40 per cent average growth over the past 10 years. The average for the entire chemical industry in the same period was nine per cent.

•

American Polymer's Brazilian Affiliate Opens New Plant

American Polymer Corporation, Peabody, Mass., has announced that its Brazilian associated company, Polymer Products Quimicos do Brazil, San Paulo, has opened a new plant.

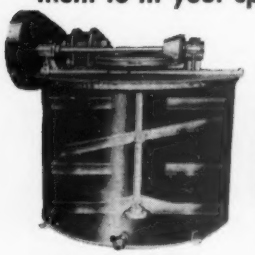
The complete plant was designed and constructed by American Polymer in the United States and forwarded to Brazil last June through its export department, Chemicals Export Company.

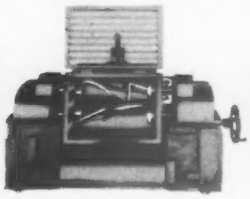
Dr. Ryan of American Polymer, has been appointed general manager in charge of production for the Brazilian company.

Ross

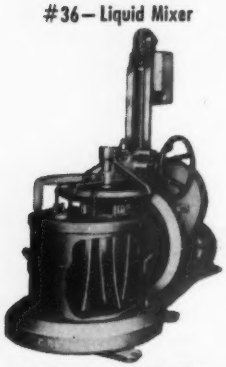
DURABILITY AND DEPENDABLE SERVICE

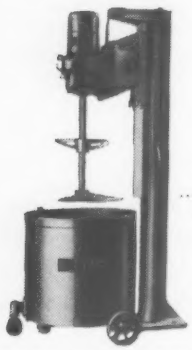
Over 80 years of Ross experience in the manufacture of Mills and Mixers of all types assures the proper selection of equipment to fit your specific processing requirements.

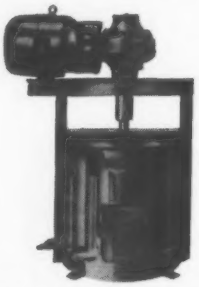

#36 – Liquid Mixer

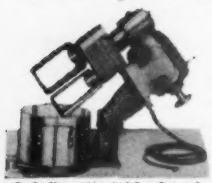

#41L – Heavy Duty Kneader

#36RM – Twin Semi-Paste Mixer


#30C – Change Can Mixer


#131AB – Change Tank Mixer


#132 – Heavy Paste Mixer


1-Gallon Variable Speed Laboratory Mixer

Mixers available in laboratory, pilot scale, and large production sizes.

Write for further details!

2,000 Gallon Agitated Storage Tank

CHARLES ROSS & SON COMPANY

148 Classon Avenue Brooklyn 5, New York

New Officers and Directors Elected for McArthur Chemicals

John P. Remensnyder, chairman of the Board of Heyden Chemical Corp., and Simon Askin, president of Heyden, have been elected vice presidents of McArthur Chemicals Chemical Co., Ltd., oldest chemical company in Canada.

A majority stock interest in McArthur was recently acquired by St. Maurice Chemicals, Ltd. of Montreal, which is jointly owned by Heyden and Shawinigan Chemicals, Ltd.

Other officers elected are: V. G. Bartram, president of Shawinigan Chemicals, Ltd., chairman of the board; Dr. H. S. Sutherland, vice president of Shawinigan Chemicals, Ltd., a vice president; R. J. James secretary-treasurer; Robert Berry continues as vice president and G. A. Lee as vice president.

Elected directors were: Dr. Sutherland, Mr. Berry, Mr. Lee and P. W. Blaylock of Shawinigan Chemicals, Ltd., and Mr. Remensnyder, Mr. Askin and F. A. Degener of Heyden.

•

C. E. Campell, Shell Industrial Sales Representative, Retires

Carl E. Campell, industrial sales representative for Shell Oil Company, St. Louis district, has retired from the firm after 25 years of service.

He has joined the Cactus Paint Manufacturing Co., Inc. at Big Spring, Texas, as executive vice president.

Mr. Campell was honored recently at a dinner in the Chase Hotel, St. Louis, at which time he was presented with several gifts.

A native of Ohio, Mr. Campell joined Shell at Bartesville, Oklahoma, in 1927. He progressed through various marketing department operations before taking over the St. Louis district, the position he held at the time of retirement.

Mr. Campell is a member of the Paint, National Varnish & Lacquer Association, and several other societies.

Vernon Barth will take over St. Louis paint accounts, and industrial work formerly serviced by Mr. Campell.

•

Advertising Club of New York Gives $500 Award to Kearns

A $500 scholarship for advertising, publicity or marketing studies has been awarded to Joseph L. Kearns, salesman for A. Gross & Company.

The award, made by the Advertising Club of New York, was given as first prize in an essay contest upon completion of the Club's course in advertising and selling.

•

Robert Miller Schrador, Veteran Continental Can Official, Dies

Robert Miller Schrader, veteran official of the Continental Can Company, died at his home in New York recently. He was 55.

Mr. Schrader joined Continental Can in 1917 as assistant storekeeper at the firm's Halstead St., Chicago, plant.

He served in a number of purchasing positions before being named general manager of purchases in 1945, the position he held at the time of his death.

ERRATA

H. P. Beardsley of the Electrochemicals Dept., E. I. duPont de Nemours & Co., Inc., Niagara Falls, N. Y. writes under date of May 21 as follows: "In the article, 'Forum on Latex Paints', question no. 14, page 29 (April), it is stated that only alkaline polyvinyl acetate emulsions are available. However, only acidic polyvinyl acetate emulsions are being marketed. The pH of these emulsions is usually in the range of 3 to 6. Most polyvinyl acetate emulsions are stable in the alkaline range, but the pH of these emulsions drifts downward due to the hydrolysis of the small amounts of residual vinyl acetate monomer to acetic acid."

YELKIN TTS

THE STANDARDIZED LECITHIN

The first and foremost lecithin in the paint industry developed ***especially*** *to meet the special requirements needed to help produce the best paint products.*

Yelkin TTS improves quality — saves time — reduces costs because it improves

- **Wetting** — Helps get best performance from pigments.
- **Suspension** and package stability at less cost.
- **Sagging** of enamels.
- **Color strength** and stability of tinting pastes.
- **Paint performance** through better brushing consistency.
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There is a reason why more paint manufacturers use Yelkin TTS than any other Lecithin . . .
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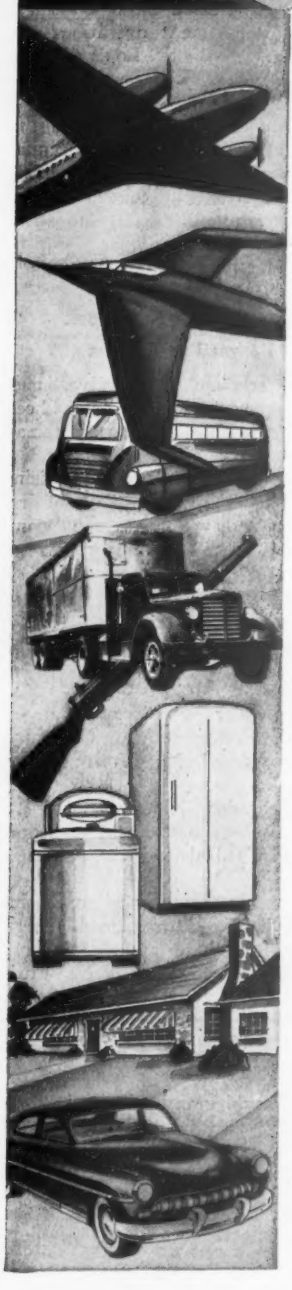
phosphate coating chemicals TO MAKE YOUR PRODUCT DURABLE



PAINT BONDING

"GRANODINE"® forms a zinc-iron phosphate-coating bond on sheet metal products—automobile bodies and fenders, refrigerator cabinets, etc.—for a durable, lustrous paint finish.

"LITHOFORM"® makes paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE",® the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal.

RUST PROOFING

"PERMADINE",® a zinc phosphate coating chemical, forms on steel an oil-adsorptive coating which bonds rust-inhibiting oils such as "Granoleum."

"THERMOIL-GRANODINE"® a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

PROTECTION FOR FRICTION SURFACES

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CALENDAR OF EVENTS

June 15-26. Sixth Paint Short Course for Beginners, North Dakota Agricultural College, Dept. of Paints, Varnishes and Lacquers, Fargo, N. D.

June 29-July 3. ASTM Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 6-17. Third Advanced Paint Refresher Course. North Dakota Agricultural College, Dept. of Paints, Varnishes, and Lacquers, Fargo, N. D.

Production Club Meetings

Baltimore, 2nd Friday, Park Plaza Hotel.

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.

Cincinnati — Oct., Dec., Mar., May, Hotel Alms.

Dayton — Nov., Feb., April, Suttmillers.

Indianapolis — Sept., Claypoll Hotel.

Columbus — Jan., June, Fort Hayes Hotel.

Cleveland, 3rd Friday, Harvey Restaurant.

Dallas, 2nd Thursday, No Fixed Place.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, Last Monday, El Jardin Restaurant, San Francisco.

Houston, 2nd Tuesday, Seven Seas Restaurant.

Kansas City, 2nd Wednesday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, Puritan Hotel, Boston.

New York, 1st Thursday, Building Trades Employers Assn.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, Annual Meetings only.

Philadelphia, 3rd Wednesday, Engineer's Club.

Pittsburgh, 1st Monday, Fort Pitt Hotel.

St. Louis, 3rd Tuesday, Forest Park Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Diana Sweets, Ltd.

Western New York, 1st Monday, 40-8 Club, Buffalo.

PATENTS

Conducted by

Lancaster, Allwine & Rommel

PATENTS AND COPYRIGHTS

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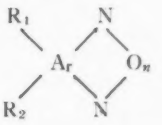
Washington, D. C.

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired to Lancaster, Allwine & Rommel.

Drying Oil Composition

U. S. Patent 2,630,438. Robert H. Rosenwald, Western Springs, Ill., assignor to Universal Oil Products Company, Chicago, Ill., a corporation of Delaware.

A drying oil composition containing an organic compound having the following empirical formula:



wherein Ar is a polyvalent aromatic hydrocarbon radical, *n* is a small whole number selected from one and two, and R_1 and R_2 are selected from the group consisting of hydrogen, alkyl, aryl, aralkyl, nitro, halogen, alkoxy, and hydroxy.

Aqueous Resin Dispersion

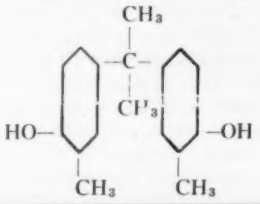
U. S. Patent 2,636,870. Harry E. Connors, Fairview Park, Ohio, and Arch L. Hatfield, Park Forest, Ill., assignors to The B. F. Goodrich Company, New York, N. Y., a corporation of New York.

An aqueous dispersion of synthetic resin useful in forming non-tacky and non-blocking films and coatings under moderate fusion temperatures, said dispersion containing as the disperse phase a mixture of polymeric materials comprising (1) a tripolymer resulting from the polymerization in aqueous emulsion of a mixture of monomeric materials consisting of from 75 to 90% be weight of vinylidene chloride, from 5 to 15% by weight of vinyl chloride, and from 5 to 15% by weight of an alkyl acrylate and (2) a vinylidene chloride alkyl alkacrylate interpolymer selected from the class consisting of (*a*) a two-component interpolymer made by polymerizing in aqueous emulsion a monomeric mixture consisting of from 85 to 95% vinylidene chloride and from 5 to 15% by weight of an alkyl alkacrylate and (*b*) a three-component interpolymer made by polymerizing in aqueous emulsion a monomeric mixture consisting of 85 to 95% vinylidene chloride, 2 to 7.5% by weight of vinyl chloride and 2 to 7.5% by weight of an alkyl alkacrylate, the said mixture of polymeric materials containing from 33⅓ to 66⅔% by weight of tripolymer (1) and from 33⅓ to 66⅔% by weight of interpolymer (2), when said interpolymer is said two-component interpolymer (*a*), and from 25 to 75% by weight of tripolymer (1) and from 25 to 75% by weight of interpolymer (2), when said interpolymer is said three-component interpolymer (*b*).

Paraffin Wax Compositions

U. S. Patent 2,636,002. Robert G. Capell, William P. Ridenour, and John A. Stewart, Pittsburgh, Pa., assignors to Gulf Research & Development Company, Pittsburgh, Pa., a corporation of Delaware.

An improved wax composition comprising a major amount of a paraffin wax and a minor amount, sufficient to inhibit oxidative deterioration, of a compound having the following structural formula:



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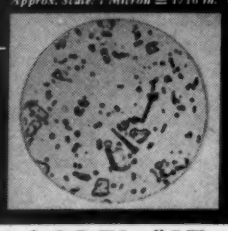
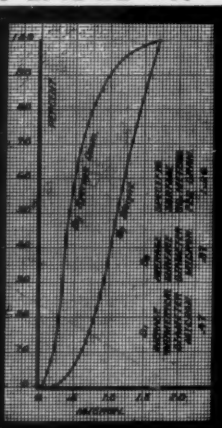
A low-oil absorption, easy wetting, lead-free Zinc Oxide.



ST. JOE GREEN LABEL #17

Representative Chemical Tests	
ZnO	99.20%
Pb	.03
Cd	.01
Cl	.02
Acidity as SO_3	.15
Total S as SO_3	.35
H_2O Soluble Salts	.70
Insoluble in HCl	.15
Loss at 110°C.	.30
Representative Physical Tests	
Particle Size	
Average numerical diameter D_1 – microns	.47
Average surface diameter D_s – microns	.87
Specific surface – Sq.M./gram	1.26
Percent fines under .50 micron	6.0
Specific Gravity	5.65
Apparent Density – lb./cu. ft.	40.
Cleanliness	
Percent thru 325 mesh screen	99.92
Oil Absorption – Rub-out	
Grams oil/100 grams ZnO	12.



Particle Size Distribution

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St. Joe Green Label #17 is a relatively large particle size, calcined Zinc Oxide which contains a minimum amount of extremely fine particles. House paints containing this pigment are characterized by excellent color, gloss and durability.

Complete physical and chemical properties of our paint grade zinc oxides are described in our new technical manual, ST. JOE ZINC OXIDES. Write for your free copy – on your company letterhead please.

Vinyl Chloride Dispersions

U. S. Patent 2,636,871. Raymond W. James, Lexington, and David W. Lovering, Needham, Mass., assignors to Arthur D. Little, Inc., Cambridge, Mass., a corporation of Massachusetts.

The process of preparing a resin coating composition which comprises milling together 50 to 80 parts by weight of plasticizer mixture of solvent and non-solvent plasticizers and 100 parts of a finely divided vinyl chloride resin consisting of at least 85% by weight of vinyl chloride having an average particle size not more than 10 microns in diameter until partial solvation is secured and until the composition has substantial length and adding as the only volatile material a volatile aliphatic petroleum hydrocarbon in an amount not exceeding 25 parts by weight of the resin, said solvent plasticizer being present in quantity of between 1.0 and 50 percent by weight of the plasticizer mixture, said solvent plasticizer being the only solvating agent for the resin employed in the process, said solvent plasticizer being an organic liquid having an evaporation rate less than that of dimethyl phthalate, and when mixed with said resin in the ratio of nine parts of plasticizer to one part of resin by weight, stirred and heated to 302°F., and cooled to room temperature, the resulting mixture is a sol, said non-solvent plasticizer being an organic liquid having an evaporation rate less than that of dimethyl phthalate; and when mixed with said resin in the ratio of nine parts of plasticizer to one part of resin by weight, stirred and heated to 302°F., and cooled to room temperature, the resulting mixture is a gel.

NOW THESE PAINTS DON'T DISCOLOR. Some years ago the light-colored paints produced in this plant began to discolor. After tracing the trouble to his thinner, the manufacturer switched to Sun Spirits. He has had no trouble maintaining his high standards of quality since he made this change.

4 REASONS WHY IT PAYS TO SPECIFY SUN SPIRITS

Sun Spirits is a carefully balanced product. It has good wetting-out power. Volatility is controlled to insure a rate of drying neither too fast nor too slow. Purity is checked and rechecked to make certain of a reliable, high-quality product. In new formulas, as well as old, and in testing new materials, you can rely on the uniformity and quality of Sun Spirits. For full information, get in touch with the nearest Sun Office.

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Polyamides Polyamines Blends

U. S. Patent 2,636,873. Boynton Graham, Claymont, Del., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

A composition consisting essentially of a blended mixture of a hydrophobic alpha-primary monoaminomonocarboxylic acid polyamide composed of monoaminomonocarboxylic acid units containing only carbon, hydrogen, the one amido nitrogen, and the one carbonyl oxygen, of intrinsic viscosity, in polar solvents, of at least 0.4, and having a water absorption at 100% relative humidity at 25°C. of less than 5% with from 1 to 25%, by weight of the mixture, of a hydrophobic polymeric polyamine of molecular weight of 1000-4000 and neutral equivalent of 200-1000, said polyamine being a product of the reductive amination of a macromolecular aliphatic poly-ketone containing only carbon, hydrogen, and keto oxygen.

Purifying Synthetic Resins

U. S. Patent 2,636,016. Carll F. Van Gilder, Roselle, N. J., assignor to Standard Oil Development Company, a corporation of Delaware.

In a process for the preparation of a copolymer resin prepared by the copolymerization of a mixture of butadiene and diisobutylene at about 0°F. in the presence of a catalyst solution consisting of about 0.1% to 5% of a Friedel-Crafts catalyst dissolved in a low-freezing, inert, non-complex-forming solvent and wherein the crude resin so produced is filtered in naphtha solution to remove insoluble impurities, the steps which comprise polymerizing the mixture of butadiene and diisobutylene to give a reaction mixture containing the solid polymer, adding a high boiling solvent naphtha in which the polymer is soluble, to make about a 40% solution of resin diluting the solution of polymer with from 5 to 10 volume percent based on the naphtha solution of resin of a monohydric aliphatic alcohol having from 1 to 4 carbon atoms, and filtering the resultant mixture to recover a clear polymer solution.

LANCASTER, ALLWINE & ROMMEL
REGISTERED PATENT ATTORNEYS

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Washington 5, D. C.
Patent Practice before U. S. Patent Office. Validity and Infringements Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.

abstracts

High Heat and Flame-Resistant Mastics

Zola, John C., Ideal Chemical Products, Inc., Culver City, Calif. Presented at ACS, Div. of Paint, Plastics, and Printing Ink Chemistry, March 15-19, 1953, at Los Angeles, Calif.

An introduction to unique resinous mastics of low thermal conductivity and high temperature flame resistance attained along with other important properties. In contact with direct flame temperatures as high as 5400°F., by low conductivity of heat they prevent metal from losing structural strength.

Some of the theories underlying the principles of flame and heat resistance are discussed from the viewpoint of hydration, fusion, gas evolution, and thermal conductivity. The materials used in the formulation of fire-resistant coatings are illustrated in relation to the underlying principles of fire-proofing. The illustrations cover the functions of the binders and fillers.

The formulations are influenced not only by the nature of the substrate, their function, and the degree of protecting against fire, but also the elements to which the coatings may be exposed. These same factors will also determine whether other supplementary means need to be employed, such as fiber glass mats or woven glass fabrics and expanded metal.

The author touches upon some of the laboratory and actual tests used to evaluate the fire-resistant properties of their coatings.

Using a specific formulation, the properties of the mastic coatings are given in relation to thermal conductivity under high heat and resistance to impact, abrasion, erosion, condensation, and prevention of metal corrosion.

The practical aspects of such coatings are not overlooked. Some of the most interesting applications are over creosote-impregnated wood, the chassis of trucks used for conveying explosive materials, structural steel, asphalt roofing, wood, and fiberboard surfaces.

Fire-Retardant Coatings For Aircraft Use

Lasch, Harold W., and Jukkola, Elmer E. Presented at ACS, Div. of Paint, Plastics, and Printing Ink Chemistry, March 15-19, 1953, at Los Angeles, Calif.

Development of a fire-retardant coating for aircraft use has been undertaken by the Wright Air Development Center of the U. S. Air Force. A suitable coating could protect valuable personnel by retarding a fire long enough to enable fire-fighting crews to extinguish it. By insulating vital areas of the aircraft from excessive temperatures it would be possible to land an aircraft safely that caught fire while in flight. Equipment used for aircraft maintenance and as accessories could be protected to prevent or localize fires originating near the aircraft.

This coating could be used on engine nacelles, fuselages, fire walls, fuel cells, vital lines and wires, instruments, equipment, etc.

The desired properties of the fire-retardant coating are as follows:

Protect aluminum from any deleterious effects when exposed to a flame at a temperature of 2000°F. for at least 30 minutes.

If of the intumescent or "blanket forming" type, the critical reaction or

DOUBLE-CHECKED CHEMICALS FROM RESEARCH TO INDUSTRY

PENTAPHEN

PARA-TERTIARY-AMYLPHENOL

Pentaphen is widely used in the manufacture of pale-colored, light-stable resins.

Pentaphen can be condensed with formaldehyde to form either reactive or nonreactive resins which are soluble in various solvents including: benzene, toluene, mineral spirits and many drying oils.

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Airco Company International, New York

decomposition temperature should be not less than 350°F.

The coating system should have good adhesion to metal (aluminum, magnesium, and steel).

Weight per 100 sq. feet, less than 12 pounds.

Coating should be flexible and water-resistant, and exhibit other good paint properties.

Should be suitable under flight conditions.

The paper summarizes the literature survey conducted and presents possible theories for methods of approach in developing a fire-retardant coating system for aircraft use. It includes extensive data on materials, groups of materials, and paint formulations. The role of puffing mechanisms, ceramics, silicones, etc., is discussed, Procedures for investigation of fire-retarding materials, methods and results of tests and other information pertaining to this project are described.

Value of Fire-Retardant Paints

Cook, George S., Chemical Materials Dept., General Electric Co., Schenectady, N. Y. Presented at ACS Div of Paint, Plastics, and Printing Ink Chemistry, March 15-19, 1953, at Los Angeles, Calif.

In 1950 some 600,000 building fires resulted in $700,000,000 fire loss. To determine whether paint may aid in

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PICCO
offers a complete line of
high quality, dependably uniform
SOLVENTS
and
SOLVENT OILS
PICCO Coal Tar Aromatic Solvents are available in a complete series of grades, from low to high boiling points, each grade being carefully fractionated to closely maintain specifications.
Complete data on all grades, and samples for testing, will be sent upon request. Please specify application.
PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PENNSYLVANIA
Plants at Clairton, Pa.; West Elizabeth, Pa.; and Chester, Pa.

DRIER TECHNOLOGY

(*From page 39*)

also found that slight amounts of Copper Naphthenate prevent wrinkling in black baking finishes.

Going further into the field of fungicides, mercury has become one of the most effective metals for combatting mildew. In the forms of phenyl mercury naphthenate and phenyl mercury oleate, both containing 10% mercury as metal, these two products are completely compatible and soluble in all regularly used paint thinners and vehicles. Neither the phenyl mercury naphthenate nor the oleate will affect the drying rate of the paint. They will not leach out of the films, nor will they affect the color or odor of the paint.

A further offshoot of the work with metals was the development of light and heat stabilizers for vinyl resins. Strontium, tin and cadmium compounds have now become standards in the vinyl industry for these purposes.

Lithium naphthenate was developed as a catalyst for alcoholysis of monomeric ester. And while on the subject of catalysts even aluminum found its place as a bodying agent.

Although, probably not connected directly with your work, I should like to mention our HC Promoters containing 6% and 12% Cobalt. These HC Promoters are prepared for use as catalysts for polyester resins. They usually are employed jointly with ether catalysts such as methyl ethyl ketone peroxide, diethyl-aniline, dodecylmercaptan and other organic peroxides.

The use of these catalyst aids makes possible the manufacture at room temperature of polyester glass fiber reinforced products which have the physical properties of the heat cured product. Reinforced plastic products are being manufactured without the labor and expense of having to use metal molds adapted for heat. Work done in the field has indicated that from .008% to .012% cobalt is used for room temperature cure of polyester resins.

the reduction of this fire damage, the process of combustion, types of fires, and theoretical role of paints under fire conditions are examined. Studies of actual fire damage have shown that properly designed paints will reduce the extent of fire damage, even though the actual degree of such protection will always be subject to question.

It is proposed that a properly designed paint would probably possess the following characteristics:

1. Be nonflammable or of low order of flammability.
2. Smooth out the surface of the substrate to reduce the surface area exposed to the air and thereby reduce rate of combustion.
3. Insulate the substrate either by being heat reflective or of an insulation nature.
4. Retain this insulation characteristic and nonflammable characteristic as long as possible under direct fire attack.
5. Possess sufficient decorative and protective characteristics of the usual paint so that the fire-retardant paint will be practical coating material.

Effectiveness of Fire-Retardant Paints

Yockers, Joe R., State Fire Marshal, Los Angeles, Calif. Presented at ACS, Div. of Paint, Plastics, and Printing Ink Chemistry, March 15-19, 1953, at Los Angeles, Calif.

Over the past few years considerable interest has been shown in the development of fire-resistive paints and treatment processes. Efforts were made as far back as the Roman Empire to reduce the fire hazard in combustible materials by treatment.

The disastrous results of the Boston Night Club, the Natchez, Miss., Night Club, and the Ringling Brothers Circus fires, directed attention to the necessity of developing ways and means of treating decorative materials and fabrics used in connection with public assemblage. These disastrous fires were immediately followed by legislation designed to prevent a recurrence of such disasters and it did not take long for the manufacturing chemist to develop good effective treatment processes whereby canvas and flammable decorative materials could be effectively treated to prohibit or retard the rapid spread of fire.

Many fighting ships were destroyed during World War II as the result of many layers of combustible paint. The manufacturing chemists have come forth with protective coatings which do not contribute fuel to a fire.

There has been considerable effort to develop paints which would reduce the fire hazard of combustible materials. Some of these processes have been tested and given ratings by the Underwriters' Laboratories for the treatment of cellulose wall board, acoustical tile, and ordinary construction lumber. However, many paints are water-soluble and others do not present the valuable features found in quality paints.

One stumbling block in the development of fire-retardant paints is the lack of standards by which the effectiveness of fire-retardant paints can be tested, evaluated, and classified. The Underwriters' Laboratory tunnel test, necessitates separate tests on each type of material covered and does not contemplate on-the-job application of the paint in existing structures.

The writer believes:

The loss of 867 lives and the injury to hundreds of other persons in the Boston and Natchez Night Club fires, and the Ringling Circus fire would not have occurred if the highly combustible materials used had been treated with proper fire-retardant.

There exists a public demand for a high quality fire-resistive paint or treatment process which combines good grade paint with the ability to prevent ignition of combustible surfaces.

There exists a definite need for standards and testing procedures whereby the qualities of fire-resistive paint may be tested, evaluated, and classified.

If an effective evaluation and classification procedure was established, acceptance and recognition by fire insurance underwriters, building safety officials, architects, and the general public would be assured.

The use of high grade fire-resistive paints would materially aid in fire suppression by restricting combustion, thus retarding the spread of fire. This

Chats about Finishes

NEW DEVELOPMENTS IN LOW-COST, ODORLESS FLAT WALL ENAMELS

by

V. J. LARSON

Research Division

Hercules' Synthetics Department

Intensive work at Hercules' products Application Laboratory has provided valuable data on the low-cost processing of self-sealing, self-priming alkyd liquids in closed set kettles or regular portable varnish-making kettles . . . merely by heating with any of the common unbodied oils.

This new technical information for formulating improved alkyd flats has been receiving the special attention of economy-minded paint manufacturers. It deals with the effective properties of Pentalyn® B56 resin, and tells how odorless solvents can be used especially when small quantities of Abitol® Hercules hydroabietyl alcohol are included.

Write to me at the address below, and I'll see that you get complete data and testing samples of Pentalyn B56 and Abitol.

V J Larson

Synthetics Department

HERCULES POWDER COMPANY

INCORPORATED

926 Market Street, Wilmington 99, Del.

1C53-4

would enable firemen to concentrate efforts on extinguishing the original fire and reduce the problem of controlling exposure fires, especially where wood frame construction and wood shingle roofs are used.

Eventually the increased acceptance and use of first quality fire-resistive paints and treatment processes could reduce our annual national fire loss by millions of dollars and save hundreds of lives each year.

The commercial and industrial possibilities for a high grade fire-resistive paint are unlimited. Such a paint would find a market in every type of occupancy, from the modest home through the largest factories and warehouses. It could become a major factor in developing our national and civil defense programs. Its greatest asset would be the fact that the safety factor in existing non-fire-resistive structures could be increased measurably.

Fire-Retardant Coatings On Acoustical Surfaces

Weil, Alice C., Mod, George W., and Chapman, A. Watson, The Celotex Corp., Chicago, Ill. Presented at ACS, Div. of Paint, Plastics, and Printing Ink Chemistry, March 15-19, 1953, at Los Angeles, Calif.

Large quantities of fibrous material are installed annually in this country in the acoustical treatment of the interior of public and private buildings. Surface coatings of such products offer a practical method of imparting improved flame resistance. A number of types of such coatings are discussed, as well as some of the test methods used to determine the degree of flame resistance.

Chemistry of Wash Primers

Rosenbloom, Harold, Thompson & Co., Oakmont, Pa. Presented at ACS, Div. of Paint, Plastics, and Printing Ink Chemistry, March 15-19, 1953, at Los Angeles, Calif.

Data have been presented which help construct a picture of the reactions which occur between wash primer constituents. Oxidation has been shown to play a dominant part. Chromate derived from the pigment is soluble in the alcoholic phosphoric acid solvent and is the source of the oxidizing power of the composition. It has been shown that phosphoric acid reacts with polyvinyl butyral, but only under the influence of the reduction of chromium.

The mechanism of this reaction has been further clarified by studying the oxidation of alcohol solutions of polyvinyl butyral by mixtures of chromic and phosphoric acids. In these systems, a chromic phosphate complex is formed. Data indicate that it is attached to the polyvinyl butyral chain, and can function as a cross linker. Phosphoric acid in excess of that required to form the complex inhibits cross linking.

Changes in the potential of electrodes immersed in wash primer compositions have been used to follow the course of inorganic film formation. The adhesive properties of the wash primers have been attributed partly to the existence of this film. As adhesion is a function of phosphoric acid concentration, it is also probably a function of the degree of reaction between phosphoric acid (or the chromic phosphate complex) and polyvinyl butyral.

Paints Containing DDT And Other Fungicides

Hadert, H., Farbe und Lack, 57 (1951), pp. 536-540.

If DDT (Dichlordiphenyl trichlorethane) is added to oil paints and varnishes it does not exert any influence at first, but gradually crystallyzes out at the surface of the film and develops a high degree of toxic influence lasting for a number of years. The efflorescent effects are not very noticeable in white and light-colored films but very much so in the darker shades. Additions of DDT and other fungicides have proved valuable in wall and roof paints where disinfecting effects are more important than appearance. Flies and mosquitos, gnats, etc. are killed by DDT-additions of about 5 percent. Fungi, sporules, etc. can be eliminated by the addition of mercury phenyloleate. phenyl acetate, phenyl chloride or phenyl nitrate in amounts of about 0.3 percent, or of mercury chloride in amounts of 0.1 percent. Mouldy growths are prevented by additions of copper and iron naphtenates.

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FOR THE UNIVERSAL FLAT
But we haven't found it. Price and performance still point to special-purpose flatting pigments for many formulations.
R-B-H carries on a continuing study of all flatting pigments . . . standard pigments as well as unique materials manufactured to our specifications. R-B-H technicians make them available to you pre-dispersed for optimum performance.
Tell us about your flatting problem.
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Pigment dispersions in nitrocellulose; ethyl cellulose; urea formaldehyde, vinyl and alkyd resins; chlorinated rubber and other plastic binders.
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METAL CANS

(*From page 28*)

that required for the so-called inside enamels. If an outside enamel is still satisfactory after the can has been packed, processed and cased, it probably will continue to be satisfactory whereas inside enamels may be satisfactory for several months of storage after packing and then show first signs of failure.

Packed cans with new types of linings must be evaluated by careful examinations over a period of at least a year and probably longer. Can linings which differ only in a minor way from linings which already have been approved may not require the extensive testing that new linings require. However, every contemplated change must be evaluated before it is put into effect because what may appear at first to be a minor change in formula or manufacturing practice designed to give an improvement in some respect may well result in definite objectionable weakness in other respects.

These evaluations are time consuming and expensive but they provide the best insurance against losses of canned products through failure of the can lining.

Organic Protective Coatings for metal cans may be only a small part of the total cost of a packed can, but they must be economical. Competition exists not only between different types of protective coatings but also between different types of containers. Of course availability is a complicating factor and this refers not only to the availability of the organic protective coatings but also to the metallic protective coating, tin. The increased use of organic coatings puts an additional burden on the rather limited enameling and baking equipment and the installation of additional equipment of this type is very expensive.

This great increase of organic coatings over the past few years has brought about a problem in inventory control. When only two or three enamels were used this was no problem but at present with the wide variety of products to be packed and the different types of plate that must be used, the number of organic protective coatings required has increased greatly. Definite attempts are made to keep this number down to an economic minimum. Any new enamel preferably should replace some other enamel rather than merely be added to the list. Also, each enamel is used for as many types of cans and products as is economically feasible to obtain a minimum inventory and the greatest range of supply. It is apparent therefore, that any new organic protective coating offered for use for metal cans must be evaluated for a relatively large number of products. It usually is not enough to find that the enamel is satisfactory for one specific product. This also indicates why there may be some hesitancy on the part of the can maker to adopt immediately a new resin, a new oil or a new enamel even though it may be somewhat lower in cost.

Future Trends

THE metal can has certain inherent desirable qualities as a container to transport and to store perishable foods and, along with other similar containers, should continue to be in demand. The present demand for can linings probably will be not only sustained but actually is expected to be increased appreciably. We may not be so certain of the nature of these future demands but there are indications that along with the general advancements in the industry, the advancements in can making will introduce new requirements for can linings. Accompanying the trend toward more automatic can manufacturing equipment will be a trend toward simplification of application and baking operations. Time is a very important factor in these operations and there are indications that at least some of the future can linings may be baked or cured in the order of one minute or less. It does not seem probable that such rapidly cured linings will come from the conventional oleoresinous field, but may be expected from the relatively new synthetic resin field.

TECHNICAL Bulletins

N-BUTYL, AMYL ACETATES

Data sheets describe the general and physical properties, specifications, and uses of amyl acetate and n-butyl acetate.

N-butyl acetate offers application in the production of lacquers and in the manufacture of finishes based on cellulose acetate butyrate and certain vinyl resins.

Amyl acetate is widely used as a solvent for nitrocellulose, ethyl cellulose, chlorinated rubber and certain grades of vinyl copolymers.

Commercial Solvents Corporation, 260 Madison Ave., New York 16, N. Y.

CADMIUM LITHOPONES

Folder contains specimen colors formulated from the Harshaw Chemical Company's cadmium lithopone pigments.

Literature also contains table describing Harshaw cadmium lithopones by specific gravity, weight (lbs.) per solid gallon, one pound bulks (gals), oil absorption and hiding powder.

Folder may be obtained by writing the company at Cleveland 6, Ohio.

PIGMENTS

Pigment and color hand book contains a color chart, information on the chemical and physical properties of Kroma reds; and technical bulletins on sparmite, VVF primer oxides and VVF siennas and umbers.

Publication is liberally illustrated with charts and tables describing the size and properties of pigments.

C. K. Williams & Co., East St. Louis, Ill.

SILICONE COLORS

Technical data sheets and descriptive booklet covering its silicone colors and a color chart showing Ferro colors adaptable to silicones has been released by the Ferro Corporation of 4150 East 56th Street, Cleveland 5, Ohio.

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Technical Bulletin available on request

INDUSTRIAL DEVELOPMENT

A capsule history of American industrial group growth and development, and what it has meant to the people and the economy is described in "The Builders" a 32-page booklet published by E. I. du Pont de Nemours & Company, Wilmington, Del. The publication, another booklet in the firm's "This Is Du Pont" series, tells how plants are constructed, maintained and operated. Literatures also outlines the many technical skills needed to keep a large scale industrial operation going.

TAR BASES

The Barrett Division of Allied Chemical & Dye Corporation, New York, N. Y., has just published a 96-page booklet titled "Barrett Tar Bases." Publication is divided into nine divisions: synonyms, specifications and properties of selected "Barrett" tar bases, forms and packaging, uses of tar bases (including bibiographical abstracts), properties of pure tar bases, typical reactions of pure tar bases, hazards and methods of handling, test methods, and references. Charts and diagrams are used to illustrate material. Firm will send copies to personnel of business companies at no cost upon request.

RESIN EQUIPMENT

Bulletin No. 2414 titled "Blaw-Knox Resin Equipment" has been published by the Process Equipment Department of the Blaw-Knox Company, Farmers' Bank Building, Pittsburgh 22, Pa. Literature describes in detail design problems of resin plants such as materials of construction, instrumentation, agitation, and methods of heating and cooling. Preliminary design questionnaires are included for the convenience of prospective purchasers. In addition to designing resin plants, Blaw-Knox also specializes in the procurement and erection of these plants. Copies may be obtained by writing the firm.

DRIERS

Data sheets on "Advance Zirco Drier Catalyst 6 Per Cent," and "Advance Rare Earth Driers" have just been issued by the Advance

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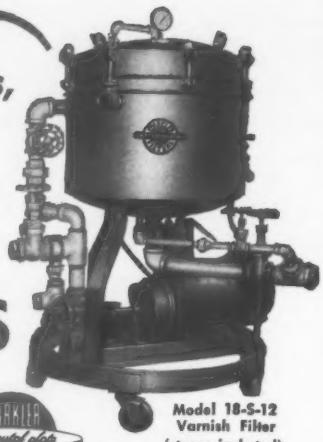
Many varnish makers now use Sparkler Filters to clarify varnish, lacquers, and other clear liquids. The brilliance and polish obtained by filtering with Sparkler Filters is far superior to results obtained with other methods of clarifying paint products.



Model 18-S-12 Varnish Filter (steam jacketed)

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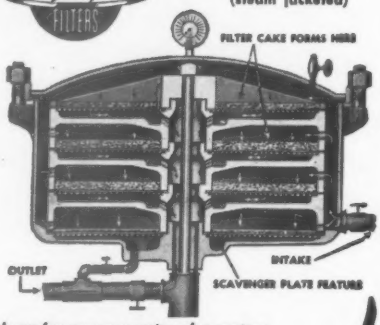

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Solvents & Chemical Corporation, 245 Fifth Ave., New York, N. Y. Specifications, physical properties, and advantages and uses of driers are described in publications. Copies may be obtained by writing the firm.

RUBBER LININGS

Eight-page bulletin describing the advantages and application of rubber lining to steel tanks, drums, pipes, valves, fittings and pumps has recently been published by the Protective Coatings Division of Metalweld, Inc., Scotts Lane & Abbotsford Ave., Philadelphia 29, Pa. Included in the literature are tables giving the resistance characteristics of MW rubber lining to inorganic acids, salts and alkalies, organic materials and a wide group of miscellaneous materials. Copy may be had by writing the company.

PAINT CATALOGUE

The Witco Chemical Company 260 Madison Ave., New York 16, N. Y., has released the sixth edition of its catalogue giving complete information regarding products, plants and technical literature. Witco's entire line of chemical products including carbon blacks, rubber stearates, driers, vinyl stabilizers, rust preventatives, etc., are described as to type, form, properties, applications and packing. Copies may be obtained by writing to Witco on company letterhead.

ETHYL ACETATE HANDLING

Safety regulations for handling, storing and shipping of ethyl acetate are described in detail in a data sheet, SD-51, published by the Manufacturing Chemists' Association.

Although ethyl acetate is classified by the Interstate Commerce Commission as a "flammable liquid", the sheet points out that the chemical can be handled with safety if employees are familiar with its hazards.

The publication also contains 100 regulations regarding loading and unloading and first-aid procedures to be followed in case anyone is exposed to excessive vapors or excessive contact to skin.

Copies may be obtained for 25 cents by writing the Association at 246 Woodward Building, Washington 5, D. C.

HEATING ENGINEERS MANUAL

A new edition of the manual titled "The Design and Process Engineers Guide to Industrial Temperature Measurement and Control" presents the basic principles of industrial temperature control and defines different types of control systems, distinguishing between them so that the engineer may select the type most suited for a particular application.

The 24-page manual discusses: The eight ways of responding to temperature; the five ways of putting that response to work; and the nine basic "Partlow" instrument types.

Manual may be obtained from the Partlow Corporation, New Hartford, N.Y.

METAL PIGMENTS AND POWDERS

250-page indexed book, known as the "MD Blue Book," has just been issued by the Metals Disintegrating Company, Inc., describing the history of the firm and its various divisions and activities.

One section contains information on the manufacture, evaluation and applications of metal pigments in all their ramifications.

Following is a section describing the making, testing and use of MD metal powders. And, as in the section on metal pigments, a complete glossary and bibliography are also included.

In addition to basic technical information, the "MD Blue Book" contains a section which includes a complete collection of MD's Technical Bulletins on metal pigments, metal powders and metal abrasives.

For executives concerned with the purchase or specifying of such products, the book may be obtained without cost.

To those who do not qualify, the book may be had by sending $5 to the firm at Elizabeth B, New Jersey

EMULSIFYING AGENTS

New developments in emulsifying agents and in emulsifying and formulating techniques are described in a revised edition of Hercules Powder Company's "Lacquer Emulsions" technical booklet.

One section deals with emulsion composition and includes material on film-formers, resins and plasticizers, solvents and diluents, emulsifiers, coloration, emulsifying equipment, emulsifying techniques, and emulsion stability.

The second section includes material on the preparation of lacquer emulsions based on nitrocellulose, and Parlon (chlorinated rubber).

Copy may be obtained by writing the company at Wilmington, Del.

RESIN REVIEW

New edition of "Resin Review" has been published by the Rohm & Haas Company, Philadelphia 5, Pa. Included in the 16-page booklet are chapters on New Vehicle for Water Paints and Shear Moduli of Rhoplex films. For copy of booklet write firm.

New Book

GLYCEROL

Edited by Carl S. Miner and N. N. Dalton. American Chemical Society Monograph. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. Price $12.00.

This book is the American Chemical Society's 500-page "Glycerol", written and edited by leading research scientists under the sponsorship of the Glycerine Association. It is felt that this monograph fills a need on the part of scientists, engineers, and executives in many fields for complete, up to-date coverage on the subject of glycerine.

The book includes sections on the sources, recovery, refining, and uses of glycerine, as well as recent developments which affect it. The manufacture of glycerine together with purification, and the design of equipment for these processes are discussed in detail. An important feature of this book is the presentation of the physical and chemical properties of glycerine, and a listing in detail of all standards and specifications now in effect for commercial grades of the chemical.

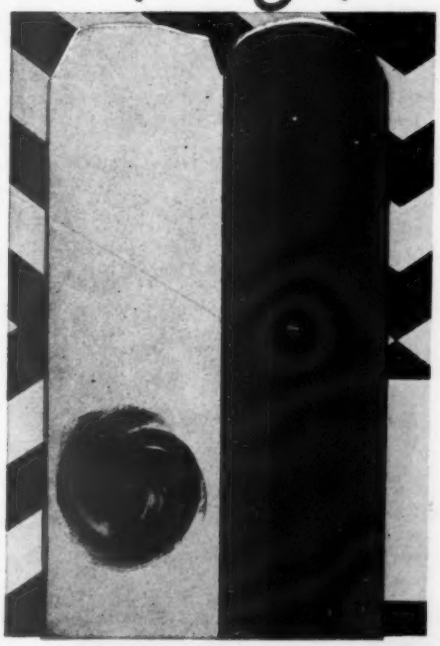
Of interest to paint and vehicle manufacturers is the chapter "Uses of Glycerine" in which there is a section dealing with the utilization of this particular polyol in the manufacture of ester gums and alkyd resins. Chapters on physiological and microbiological uses are also presented.

TENLO-70

eliminates "blanching" in odorless flats*

Tenlo-70 wets-out all *the pigment. In odorless flats, this prevents selective flooding of a portion of the white pigment ("blanching").*

Here's a retouched photograph that doesn't prove a thing!



These are sample-strips of a typical odorless flat wall. The sample on the right was ground with 8 pounds of Tenlo-70 per 100 gallons.

The control strip (left) is masked by a white pigment float. Rubbing has developed a spot of true color.

The uniform true color of the Tenlo-treated sample is not affected by rubbing, showing that the pigment float has been eliminated.

In *your* finished paint this means a product that can be lapped and patched. Sags and runs can be picked-up in partially-set films without giving a streaked appearance.

Although this photograph *shows* what Tenlo-70 can do for your odorless flats, it doesn't *prove* anything. The only way to prove the effectiveness of Tenlo-70 is to use it in your own formulation.

*Control of "blanching" is only one of the advantages of Tenlo-70. It also retards skinning and controls hard settling. This can eliminate the need for anti-skinning and bodying agents.

Get all the facts on Tenlo-70. Write today for free illustrated folder.

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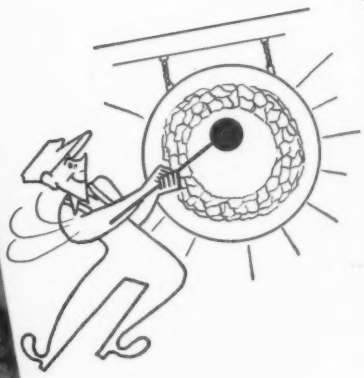

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